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REPORT

OF THE

DEPARTMENT OF MINES,

NOVA SCOTIA,

FOR THE YEAR ENDING SEPTEMBER 30, 1898.

HALIFAX, N. S.:
COMMISSIONER OF PUBLIC WORKS AND MINES,
QUEEN'S PRINTER,
1899.

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DEPARTMENT OF MINES.

REPORT FOR THE YEAR ENDING SEPTEMBER 30, 1898.

To His Honor MALACHY BOWES DALY, *Esquire, Lieutenant-Governor of Nova Scotia, &c., &c.*

MAY IT PLEASE YOUR HONOR,—

I respectfully present herewith to Your Honor the Annual Report of the Inspector of Mines, containing an account of the progress of mining operations, together with statistical information compiled by him from official and other returns.

I remain,

Your Honor's obedient servant,

CHARLES E. CHURCH,
Commissioner of Public Works and Mines.

HALIFAX. *December 30th, 1898.*

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REPORT

ON THE

MINES OF NOVA SCOTIA,

By EDWIN GILPIN, Jr., A. M., LL.D.,

FELLOW OF THE ROYAL SOCIETY OF CANADA.

Office of Inspector of Mines,

Halifax, *December 29th, 1898.*

To the Honorable

Charles E. Church, M. P.P., M. E. C.,

Commissioner of Public Works and Mines :—

Sir,—I beg leave to submit the following report on the Mines of Nova Scotia.

The following summary shows, so far as I have been able to learn, the mineral production of Nova Scotia for the year ending September 30th, compared with that for the year ending September 30th, 1897.

		Year ending Sep. 30, 1897.	Year ending Sep. 30. 1898.
Gold	oz	26,579	31,104
Iron Ore*†	Tons	44,146	31,050
Manganese Ore†	"	100	75
Coal raised†	"	2,320,916	2,281,454
Coke made†	"	45,000	42,000
Gypsum†‡		125,000	131,000
Grindstones, etc§		32,400	38,000
Limestone†	Tons	25,000	24,000

* Not including imported ore.
† Ton of 2,240 lbs.
‡ Amount exported.
§ Value in dollars.

An examination for granting certificates to colliery officials was held during the year, and the following persons received certificates:—

MANAGERS.

John Caddegan,	Bridgeport.
Jas. W. McIntosh,	Thorburn.
Alex. McDonald,	Reserve.
Alex. McEachen,	Bridgeport.

UNDERGROUND MANAGERS.

John Casey,	Glace Bay.
W. A. McKenzie,	"
Alex. Cameron,	Bridgeport.
Thos. Coleman,	"
R. B. Crosby,	"
Rod. McIntyre,	"
John McNeil,	"
Norman McDonald,	"
W. G. Ross,	Reserve.
Angus A. Ferguson,	"
John Munro,	"
John McPherson,	Springhill.
Danl. G. Love,	Thorburn.
W. M. Bartholomew,	North Sydney.

OVERMEN.

Alex. F. Ross,	Westville.
Everett Sutherland,	"
Chas. Martin,	Springhill.
Wm. A. Wilson,	"
Lauchlin McNeil,	Bridgeport.
Neil A. McDonald,	"
Joseph McPherson,	"
Rory Gillis,	"
Angus J McCuish,	"
Andrew Irvine,	"
H. Dickson,	Sydney Mines.
Geo. S. Slavin,	"
J. J. McNeil,	Glace Bay.

At an examination, held Oct. 26, 1898, certificates as follows were granted to candidates for positions in connection with engines used for raising and lowering men into and out of the mines.

FIRST CLASS.

Joseph J. McKinnon,	Sydney Mines.
R. J. Bell,	Stellarton.

SECOND CLASS.

Neil McDonald,	Bridgeport.
Dan A. McDonald,	"
Kenneth Morrison,	"

THIRD CLASS.

Angus C. McNeil,	Amaguades.
John McNeil,	Sydney Mines.
Augustine McDonald,	"
Thos. W. Carr,	"
Michael J. Hartigan,	"
John Frances,	"
Alex. McInnis,	Dom. No. 1.
Hugh McDonald,	Bridgeport.
Walter Grahame,	"
Dan. McKeigan,	"
John A. McDonald,	"
George Miller,	Mira,
Philip Smith,	Port Morien.
Walter McAulay,	"
John Kinian,	Stellarton.
Alex. Ross,	Westville.
John Purvis,	"
William McGillivary,	"
Chester Bowlsby,	Joggins.
John E. Redhead,	Springhill.

The local boards have continued during the year to examine candidates for miner certificates.

During the past year surveys have been made at Upper Newport, Liscomb Mills, Leipsigate, Stormont, Whycocomagh, Renfrew, North West, Upper Glencoe, Montague, Ecum Secum, Middle River, Clam Harbor, McMillan's Lake, Shier's Point, etc.

I beg leave also to submit a report on the Middle River, Whycocomagh and Cheticamp districts of Cape Breton by I. Edward Woodman. This gentleman, who has already been engaged in geological work in the Province, is associated with Professor Shaler of the Geological Division at Harvard University: Owing to unavoidable causes he was not able to spend as much time in the field as had been originally intended. He was, however, enabled to make a somewhat extended examination of the localities referred to.

In view of the attention periodically drawn to the Middle River as a source of gold and the assertions that the district was valueless from a miner's standpoint; in view of the claims made for Whycocomagh as a rich alluvial and gold and silver mine district, and of the discredit thrown upon it by those who were disheartened by not

finding immense free gold ledges on the surface of their areas, with little or no expenditure of money or work; and in view of the collapse of the Cheticamp River as an alluvial gold field, it was deemed advisable to secure an opinion from a disinterested source.

I have on several occasions drawn attention to the probability of the northern part of Cape Breton yielding valuable deposits of gold, silver, lead and copper. However, as an outside opinion was worth more than one from officials of the Provincial Government, and would carry more weight with the world at large, Mr. Woodman's services were secured.

He approached the subject with no predetermined views, and you will be pleased to learn that he considers the districts promising, and that their mineral possibilities have been very much under-valued, and that they should, if properly prospected and developed, prove valuable additions to our mineral wealth.

In my report to your Hon. Government on the gold and other ores of Nova Scotia, reference was omitted to the Lake Catcha Gold district. I have inserted in the reference to the Gold districts in operation last year, such notice of the district in question as was given to other important districts in the report. I may say that this report, a large edition of which was printed, is being circulated in England, Canada and the United States, and has, I believe, led to enquiries about our gold mines.

Last year Mr. William Maddin, Jr., who had acted as Deputy Inspector for the Cumberland and Pictou districts, resigned, and accepted a position as Deputy Inspector under the Dominion Government in the Yukon district. His duties were ably and efficiently discharged during his term of office, and he acquired the respect and confidence of all persons in connection with his duties as Inspector. He was succeeded by Mr. Malcom Blue, ex-manager of one of the Collieries of the Cumberland Railway & Coal Co. of Springhill.

COAL TRADE.

The returns of Coal sold during the year 1898, show, in comparison with those of 1897, as follows :—

	1897.	1898.
Nova Scotia	641,308	667,252
New Brunswick	242,043	266,789
P. E. Island	62,032	93,241
Newfoundland	75,990	62,051
Quebec	875,874	944,160
West Indies	9,356	.....
United States	106,279	98,027
Other Countries	.....	3,877

The production was 2,281,454 tons compared with 2,320,916 tons in the year 1897.

There is an increase in the sales in Nova Scotia, New Brunswick, Prince Edward Island and Quebec, the sales to the last named point coming close to the million mark. There has been a decrease in the Newfoundland and United States sales. It is confidently expected that in a few weeks shipments of gas coal to Boston from Cape Breton Collieries will be commenced on a basis of at least 700,000 tons per annum. If this be carried out and no unforeseen obstacle intervenes, the total sales of next year should be in the vicinity of 3,000,000 tons.

The total sales for the year were 2,135,397 tons, compared with 2,013,421 tons in 1897.

CUMBERLAND COUNTY.

SPRINGHILL.

During the year the fire in the east slope was totally extinguished. The west slope was rebuilt, and the north bankhead and all other underground workings put in good order. The quality of the coal has materially improved to the dip. A tunnel has been

started to prove the underlying seams, several of which are of workable size. Explorations have shown that the three worked seams form another basin to the south, thereby greatly enhancing the value of the property.

Work was continued as usual at the Joggins. In the fall some trouble was experienced with water. Little was done at the small mines. The sales of the county were 352,270 tons compared with 339,220 tons in 1897. The sales of the Springhill Mines were 287,792 tons; of the Joggins Mines 64,113 tons.

PICTOU COUNTY.

There have been no new developments of interest in this county during the past season. The sales were, from the Acadia Collieries 173,167 tons, and from the Intercolonial Colliery 208,248 tons. The total sales being 381,415 tons, compared with 340,234 tons in 1897 and 351,693 tons in 1896.

The operations at the Pictou and Cumberland Mines were inspected as usual by Mr. Maddin up to July, when the work was taken up by Mr. Malcom Blue, of Springhill. Mr Blue holds a manager's certificate, and was for a number of years in charge of one of the Springhill Collieries. I have no doubt he will discharge his important duties to your satistaction. A brief report from him will cover the interval between Mr. Maddin's resignation and the close of the year.

WESTVILLE, N. S., June 30th, 1898.

E. GILPIN, ESQ.,

Deputy Commissioner and Inspector of Mines

for the Province of Nova Scotia.

DEAR SIR,—

I have the privilege of herewith submitting you a condensed report on the various coal mines in the districts of Pictou and Cumberland counties. This will not be a full year report, but will cover from September 30th, 1897, till June 30th, 1898, at which time I tendered, and the government accepted my resignation.

McGREGOR PIT, ALBION MINES.

Since my last report very little has been done at this mine. The levels on No. 6 "lift" which is down 3596 feet have been extended east and west 600 feet and 400 feet respectively. They are still sinking the slope, which is now down 5018 feet. The last two or three hundred feet is level, or nearly so. There is now in sight a block of good marketable coal 3000 feet x 9000 feet x 8 feet, having only the "levels" driven through as mentioned above. The ventilation in this mine is very good.

THIRD SEAM SLOPE.

In my last report I stated that the sinking in this slope was down 700 feet. This distance has been increased to 1000 feet, and the "level" will be advanced 1100 feet, when this seam will be connected with Cage Pit Seam by a "tunnel." This will make a splendid "lift" of coal. An engine has been placed on the Cage Pit "level" and the "slants" between the Cage Pit and Foord Pit have been cleaned to a depth of 700 feet, or to the point at which the water floods the Foord Pit. This is where the seams will be connected.

From the "slants" westward there is a block of coal about 5000 feet x 600 feet x 10 feet, through which four "back-balances" have been driven up to the main haulage "level." The third seam is also about ten feet in thickness and seven thousand feet in breadth. The coal on main "level," east side, has all been won for a distance of about 1200 feet from the face of the "level." On the west side the "level" was stoped at a distance of 6000 feet from the "slope," and the "pillars" are now being drawn from this point back to the old broken, which will be a distance of 900 feet. The small overlying seam has been worked to good advantage. There is a very large amount of coal now in sight in these seams and the ventilation is very good.

ACADIA MINE, WESTVILLE.

The lower "lift" in this mine, which I described in my last report, is still being worked on the same principle. The "level" on the south side is now in 1800 feet. 1700 feet in from the "slope" a "jig" has been driven up to the 4000 feet "lift," which shortens the air return and makes a marked improvement in the ventilation. 1300 feet in from the slope, on the north side level, which is in 1600 feet from the "slope," another "jig" has been started up the hill to connect with the 4000 feet "lift" also. When completed it will serve for the same purpose as the one already mentioned on the south side, viz., to improve ventilation. The coal has been taken out on the south side from the face of the "level" on the 4000 feet "lift" to within 2500 feet from the "slope." On the north side it is all out from the face of the "level" to within 1700 feet of the slope. This mine is now in as good a working condition as it has been for several years.

DRUMMOND COLLIERY, WESTVILLE.

All the coal on the south side of the 4000 feet "lift" has been successfully taken out, except the "pillars" on No. 1 balance, and these are being drawn rapidly. On the north side, same "lift," all the coal is out. In my last report I stated that there were five

"bords" working on the inside "balance," of the 4400 feet "lift." These five "bords" were driven as far as the coal was considered good, and the "pillars" drawn. The "bords" on the adjoining "balance," 400 feet outside of this one, have been driven through to the inside "balance," and "bords" have been started on a third "balance," 400 feet still further outside of this one. Owing to the great weight at this depth, the management are experiencing some difficulties in winning the coal.

The north "level" on the 4400 feet "lift" was stoped last November at a distance of 3523 feet from the "slope," and the inside "balance" on this "level," which I mentioned in my last report as being driven through to the "lift" above, was started on the "longwall" system. The mode of operation is as follows:—

"Pillars" 48 × 70 feet are left next the balance, this leaves the "cuts" about 55 feet each in breadth, and they are kept about 30 feet in advance of each other. The timbering which is done by "shiftmen" is done in the following manner:—Two rows of "packs" are carried, the one on the high side of the road, the other on the high side of the "cut." The row of "packs" on the high side of the "cut," supports the roof on the low side of road for the next "cut," and so on up to the "lift" above. At a distance of 400 feet outside of this another "balance" has been driven through to the "lift" above, which will be worked on the same principle.

The length of this "slope" has been increased to 5006 feet since my last report, at which point a "fault" was encountered. The course of the "slope" is S. 79° E. (Magnetic 1897). The "fault" runs S. E. by N. W. 45°. A "place" was driven nearly at right angles to the "fault," and on an average pitch of 55°, proving the displacement to be 35 feet vertical. The coal on the other side of the "fault" was found to be lying in good order and of an excellent quality.

NUMBER FOUR SLOPE, (Drummond Colliery.)

This "slope" which was idle all winter, resumed operations on April 1st. They are merely continuing the work which was commenced last year, viz., drawing "pillars." I am pleased to state that this slope as well as Nos. 1 and 2, is in good condition, and well ventilated.

SCOTT PIT, (Drummond Colliery.)

This mine is undergoing complete repairs. The old "fan shaft" on the main seam (which is 19 feet thick at this point), 63 feet in depth, was retimbered and continued to a farther depth of 218 ft., 6 in. to the Scott pit seam, which is 12 ft., 3 in. thick at this point.

The "shaft" was then continued 79 feet, 3 inches further, at which point the third seam was struck. The third seam at this point is 8 feet, 6 inches. The shaft was then continued 7 feet 6 inches for the purpose of a "sump," making a total distance of 408 feet, and finished 10 feet x 10 feet in the "clear." The hoisting shaft at this mine was 225 feet deep, and 12 feet 10 inches x 5 feet 10 inches in the clear. At the time of the explosion in 1893, caused by lightning, this shaft received considerable damage, the bottom timbers were blown out, allowing the measures to slip away from a height of 40 feet. It is now undergoing complete repairs by being enlarged from top to bottom to a size of 12 feet by 10 feet in the clear. The old fan which was used to ventilate the main seam will remain and ventilate the Scott pit now, and the third seam when required.

SPRINGHILL MINES.

The fire which started in the pipe slope, No. 1, on December 24th, 1896, was extinguished December 31st, 1897. As I mentioned in my last report, this was an old pipe slope which had been in use 20 years, and the surrounding "pillars" were badly crushed by escaping steam, heat, etc., consequently it was quite an undertaking to extinguish it. The great difficulty was to confine the fire to the pipe and main slopes, it having reached the main slope before it could be built off. Owing to the great heat and pressure, rents or breaks were continually occurring through which the fire would rapidly make an appearance, but the management, ever watchful for such an emergency, would extinguish these outbreaks and rebuild the openings before the fire could make much headway.

The fire was extinguished in the following manner:—The Company has several reservoirs which are connected together. These occupy an elevation considerably higher than the mouth of the slopes. From these reservoirs a line of pipe was conducted down the pipe slope to the 800 feet "lift," thence across to the travelling slope and up this slope to the top "head." At each "head" along these slopes, valves and rubber hose were attached. The "stoppings" across the slopes at the 800 feet "lift" were likewise provided with valves and hose. The water pressure on these pipes, at the 800 feet lift, was about 200 pounds per square inch. A 4 inch steam pipe was led down the travelling slope to the 800 feet lift, and turned up through the bottom "stopping" on the main slope. Another 4 inch steam pipe was led direct from the boilers on the surface to the mouth of the pipe slope, and entered through the stopping at the surface. The steam pressure on these two pipes was 45 pounds per square inch, and this was maintained day and night for about ten months. The application of steam and water at so many different points, and for such a period of time undoubtedly had much to do with the extinguishing of the fire, but I think a still greater effect was had from another source. Large quantities of surface clay and earth were hauled from time to time, and deposited at the entrance of the pipe and main slopes.

A valve was placed in the bottom "stopping" of the main slope to relieve the water pressure when a large body accumulated. A large volume of water was then turned on, which washed the clay and earth down the slopes and over the region of the fire, causing the sediment to be almost universally distributed. When a crush occurred which caused an opening to the fire, muddy water rushed out, and when this ceased all clefts and crevices were found coated with sediment. Upon opening these slopes it was found that the only points at which the fire still burned was where "falls" had diverted the earth and water from their course. The temperature for eight or nine months after the fire originated was from 200° to 212°. When the slopes were opened the temperature was 164°; but by spraying with water and keeping up a good current of air to draw off the steam and fumes, the temperature was soon reduced to a minimum and the fire totally extinguished. This is the first instance, to my knowledge, in which earth and clay were used in this manner, and in large quantities, and I have no hesitation in concluding that they were the greatest factor employed in extinguishing this fire.

This is the second fire the present management have successfully dealt with, and at present the mines are all in good condition. A new bankhead has been erected at No. 2 slope, which is fitted up with all the latest improvements for handling coal. The slope has been retimbered and laid with heavy fish-plate rails down to the 2600 feet lift, preparatory to increasing its output. This slope will soon, in all probability, be the largest producer, as the "pillars" from No. 1 slope will be taken out through it by means of the tunnels which are now completed, and preparations are now being made to begin drawing them at an early date.

No. 3 SLOPE (SPRINGHILL MINES.)

They are still drawing "pillars" on the 1800 feet "level," west side. All on Nos. 6, 7, 8 and 9, "back-balances," also "railroad pillars" have been successfully drawn, and Nos. 5 and 5½ are now being drawn. There is still a block of coal 2000 feet x 500 feet between No. 5 "balance" and the slope.

The tunnels on the east side which were being driven in order to connect with the underlying seam (3 feet 9 inches thick) are still being pushed forward. The "levels" are now in about 2000 feet, and at intervals of 300 feet shoots are driven up. This is a very fine seam of coal.

On the 2600 feet "lift" the "level" on the west side is in 2600 feet, and two "back-balances" have been driven up to the 1800 feet lift. This slope has been sunk another "lift," which makes it now 3200 feet in depth, and "levels" have been turned off at right

angles at the bottom. It is a fact that all our coal seams improve in quality towards the deep, but in this seam the improvement is greater than usual. The small bands of coarse coal, which render it difficult to make clean coal, have entirely disappeared, and nothing now remains but the pure coal, which to all appearance is much superior in quality to that which was nearer the rise.

The pipe slope is nearly all on packs of timber, with iron rails for booms and iron hangings for steam pipes. The airways are good and the mine at present is in first-class condition.

THE JOGGINS MINES.

In my last report I stated that the management of this mine were very busy making connections between Nos. 2 and 3 slopes. This they have accomplished, and the "lift" of coal gained by this operation, being nearly worked out, the management have found it necessary to sink No. 3 slope still deeper in order to increase their output. After sinking it an additional 600 feet, owing to the accumulation of water, and the fact that No. 2 slope is down 3000 feet and full of water to the 1900 feet "lift," it was found necessary to introduce a large pump. This, I am informed, they have procured, and a new pipe slope is being constructed on the east side of No. 2 slope. It is the intention of the management to get all the water out during the dry season, and then build a permanent house for the pump. When this is completed Nos. 2 and 3 slopes will be connected at the 2600 feet lift, which will give a very large block of coal. The work on No. 3 "balance" 1900 feet lift is being advanced as usual. This "lift" of 600 feet is being worked "longwall" and very satisfactorily too. The little fan has developed good results, the mine is well ventilated, and in good condition.

MINUDIE MINE.

Leander McAloney sunk a slope on a seam of coal which underlies the old Minudie Seam, at which he employed several men for 3 or 4 months. This seam which is from 20 to 26 inches thick has only been tested along the crop to a depth of 50 or 60 feet.

OLD LAWSON MINE.

Jeffery Lockhart employed 2 or 3 men for 3 months and took out some coal from the crop of the Second Seam on this property. The seam is about 3 feet thick.

SMITH'S MINE, (Maccan Station.)

Abner Ripley employed from 2 to 6 men in the mine during the year. He sunk the slope an additional 50 feet, making the total 140 feet. There are two seams in this slope, with a vein of fire clay

and shale, about 6 feet in thickness, running below. Both these seams were tried to the north for about 600 feet; but very little was done on the south side.

SCOTIA MINE.

This mine has worked about seven months, employing from 3 to 9 men. There are two seams on this property which are 3 feet 8 inches and 3 feet thick respectively, and both are being operated. There was a fire in this mine about 3 years ago; but it has since been extinguished and the mine is in good condition.

The owners have complied with the law and employed a certificated underground manager.

THE JUBILEE MINE.

This mine is situated about two miles from Maccan Station on the line of the Joggins Railway with which it is connected by a branch. A slope 190 feet in depth was sunk on one of the seams, which is 20 inches thick and of an excellent quality.

The "levels" have been driven east and west 300 feet from the slope. The coal to the rise is being worked "longwall" and can be done very cheaply. They have a very nice hoisting engine and boiler, and a good pump. The water in this mine does not accumulate very rapidly, owing to the fact that they have a good vein of blue clay overlying their coal measures which prevents the surface water from getting in. This mine also complied with the law in reference to certificated mine managers, and I am pleased to state that everything is in first-class condition.

CHIGNECTO MINE.

A sample of coal from this mine has been tested for coking purposes, and I am informed that the results were very favourable This is about all that has been done at this mine. James Baird late manager of Joggins Mines, superintended this work.

VALE COLLIERY, (Thorburn.)

On the morning of the 30th of January, the bank-house at this Colliery was totally destroyed by fire. The night watchman says he left the bank-house at about 5 o'clock a. m., and that everything at that time was as usual and no indications of fire apparent. Shortly afterwards the man in charge of the boilers, close at hand, discovered that the buildings were on fire and immediately blew the fire whistle. Soon nearly all the inhabitants of the village were on the scene and all worked with a will in order to save the buildings if possible.

The extinguishing of the fire, however, proved too great a task for their engines, owing to the fact that the bank-house, which was twelve years old, had been so saturated with oil and grease that the flames kept spreading with increased rapidity. The manager then, seeing that it was impossible to save the bank-house, turned his attention to the mine, boiler-house and engine-house, which were now in danger.

For a time it looked as if these, too, were doomed. The bank-house was cut clear from the mine, and although there was plenty of water, good pumps and hose, and plenty of miners, who fought the flames only as miners can, still it taxed their energies to the utmost to save their property. However, after a desperate struggle, this was accomplished, so that the bank-house, with some of its contents, was all that was destroyed. Had it not been for the persevering efforts of the miners of Thorburn on that occasion the loss of property would have been much greater, and too much credit cannot be given them for the heroic efforts put forth to save the property of the company.

A temporary bank-house was at once erected, and 200 tons of coal raised for immediate use, during which time preparations were made for a permanent structure. The new bank-house was started about the 1st of March and completed about 1st of April, at which time they resumed hoisting coal.

This mine has been idle the greater part of the year. The principal work done was on the east side where the level has been extended 500 feet. Two "back-balances" have been driven up from the "level" with 12 "bords" on one and 10 on the other. The airways and the mine throughout is in very good condition.

I have the honor to remain,

Yours very faithfully,

WILLIAM MADDIN, Jr.,

Deputy Inspector of Mines.

Amount of Air in circulation per minute in the Underground Collieries as per measurement at each official visit.

Mine.	County.	1897.			1898.								
		Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apl.	May	June	July	Ang.	Sept.
Acadia Mine	Pictou	60000	59200	52700	58000	57200	55600	53900	54900	.....	.....	.....	.....
McGregor Pit	"	121000	118000	139000	116920	109920	107000	104200	106000	.....	.....	.....	.....
Third Seam	"	67700	68000	69700	72300	74120	74000	73700	72500	73000	.....	.....	.....
Six Foot Seam	"	22600	26000	33000	32700	Idle	Idle	30000	31700	.....	.....	.....	.....
Drummond Colliery — Mines Nos. 1 & 2	"	74000	82000	79800	77240	75700	81700	76200	79700	80000	.....	.....	.....
Drummond Colliery — " No. 4	"	9000	10000	Idle	Idle	Idle	Idle	13500	14000	14500	.....	.....	.....
Drummond Colliery — Seot Pit	"	Idle	Idle	Idle	Idle	Idle	Idle	Idle	40000	.....	.....	.....	.....
Springhill Mines — No. 1	Cumberland.	.....	20000	22500	Idle	23000	Idle	Idle	Idle	22500	.....	.....	.....
Springhill Mines — No. 2	"	74200	70400	59900	74000	72000	75500	70700	70200	71000	.....	.....	.....
Springhill Mines — No. 3	"	80300	92800	97500	107000	104200	101700	87000	81700	80500	.....	.....	.....
Joggins Mines — No. 2	"	20000	23000	25700	27700	30900	Idle	30000	26100	27000	.....	.....	.....
Joggins Mines — No. 3	"	22000	24000	28500	29200	29800	Idle	29700	33000	33500	.....	.....	.....
Minudie Mine	"	Idle	1000	900	Idle	Idle	Idle	Idle	Idle	.....	.....	.....	.....
Smith's Mine	"	Idle	500	700	700	800	Idle	Idle	Idle	.....	.....	.....	.....
Seotia Mine	"	1500	1500	1700	2000	2100	2000	Idle	Idle	.....	.....	.....	.....
Chignecto Mine	"	500	550	400	800	600	Idle	Idle	Idle	.....	.....	.....	.....
Jubilee Mine	"	1750	1100	1900	2100	4400	4200	Idle	Idle	.....	.....	.....	.....

Date of Official Inspections.

Mine.	Locality.	County.	1897.			1898.								
			Oct	Nov.	Dec	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
Acadia	Westville	Pictou	21	18	21	15	17	21	21	18	....	....	....	....
McGregor Pit	Stellarton	"	20	12	14	13	14	8	Idle	12	....	....	....	....
Third Seam	"	"	19	11	13	12	15	7	20	13	9	....	....	....
Six Foot Seam	Thorburn	"	11	10	9	26	9	11	Idle	Idle	....	....	....	....
Drummond Colliery	Westville	"	16	15	11	11	16–21	10	19	10	8	....	....	....
" No. 4	"	"	18	16	Idle	Idle	Idle	Idle	18	17	13	....	....	....
" Scott Pit	"	"	Idle	Idle	Idle	Idle	Idle	Idle	18	17	....	....	....	....
Springhill Mines, No. 1	Springhill	Cumberland.	Idle	4	3	4	1	2	5	Idle	2	....	....	....
" No. 2	"	"	Idle	4	2	6	2	2	6	4	2	....	....	....
" No. 3	"	"	1–2	3	2	5	2	1	6	3–14	3	....	....	....
Joggins Mines. No. 2	Joggins	"	4	1	1	7	4	Idle	1	5	4	....	....	....
" No. 3	"	"	4	1	1	7	4–18	Idle	1	5	4	....	....	....
Minudie Mine	.....	"	5	2–30	Idle	7	Idle	Idle	Idle	Idle	....	....	....	....
Smith's Mine	Maccan	"	5	2–30	Idle	8	5	Idle	Idle	Idle	....	....	....	....
Scotia Mine	.....	"	5	5–29	Idle	8	7	3	Idle	Idle	....	....	....	....
Chignecto Mine	.....	"	Idle	5	Idle	8	7	Idle	Idle	Idle	....	....	....	....
Jubilee Mine	.....	"	4	1	4	8	5	3	Idle	Idle	....	....	....	....
Charcoal Iron Mines	Bridgeville	Pictou	15	25	....	22	....	25	10	....	....	....	....	....
Lawson Mine	.....	Cumberland.	4	2	4	7	....	4	....	....	....	....	....	....
Fifteen Mile Stream	.....	Halifax	....	....	....	19–20	....	....	....	....	....	....	....	....
Mitchell Mine	Thorburn	Pictou	....	....	....	....	9	11	....	....	....	....	....	....

ACCIDENTS.

No.	Date.	Mine.	Name.	Occupation.	Remarks.
	1897				
1	Oct. 9	Third Seam.	James Roche.	Cage Runner	The cage was derailed and caused him to break his arm.
2	Nov. 4	Acadia Mine.	Allen McLeod.	Miner.	Caught in a full rake, breaking his jaw; also cutting his head.
3	Dec. 2	Drummond Colliery	Michael Breen.	Sinker.	Struck on the head by a piece of rock from side of shaft and killed.
4	" 8	No. 1 Slope, Spr'hill.	James Ferguson.	Shiftman.	Killed by a fall of roof while opening No. 1 slope, which was on fire.
	1898				
5	Feb. 8	No. 3 Slope, Spr'hill.	William Price.	Loader.	Injured on the head by a fall of stone in the last 2600 ft. level.
6	" 16	No. 3 Slope, Joggins.	Clarence Ripley.	Miner.	Leg broken by fall of coal at working face.
7	" 17	"	Emil Lefavour.	"	Struck by a cage loaded with a box of stone and killed.
8	" 21	Drummond Colliery.	Andrew Darrah.	"	Darrah and Simpson were killed by a fall of top-coal, at working face in No. 1 pillar No. 11 landing on the 4000 ft. lift. Gray was injured by same fall, same time and place.
9	"	"	Robert Simpson.	"	
10	"	"	William Gray.	"	
11	Mar. 5	Third Seam.	Donald McKay.	Miner.	Killed by a fall of coal from working face, pillars.
12	Apl. 11	No. 4 Slope, Drum'nd	David Wilson.	Loader.	Injured by a prop striking him and died 4 days subsequent.
13	May 12	No. 3 Slope, Spr'hill.	John Boran.	Miner.	Killed by a fall of stone from the roof in his working place.
14	Jun. 22	Drummond Colliery.	R. McLellan.	Stone picker.	Caught between picking table and receiving apron, smashing his ankle necessitating an amputation.

SPRINGHILL, 30th Sept. 1898.

DR. E. GILPIN.

Deputy Commissioner and Inspector of Mines :—

DEAR SIR,—I beg to submit to you a report of my visit to the mines of Pictou and Cumberland Counties, and am pleased to say that I found everything at various Collieries in very good order. I suppose that my predecessor, Mr. Maddin, has made out a full report of work and prospects at the various mines, which will reduce mine very materially. I regret to report the following accidents, viz :— August 15th, No. 4 Slope, Drummond Collieries, John Graham (boy,) arm broken subsequently amputated, getting on Rake in Slope while in motion.

September 9th, 1898, McGregor Mine (Albion), while shunting coal Thos. Stewart (Overman) and James Campbell (Slope Bottomer,) the box jumped the track at the switch and sided over on the men, breaking Campbell's leg a little above the knee and Stewart's ankle is badly sprained.

By the resignation of Mr. Thos. Blackwood, Joggins Mines, Walter Johnston, Esq., is now the underground manager. Donald Hayman the U. G. M. of the Drummond Collieries, resigned and John McDonald now holds that important position.

A number of men were discharged at Thorburn lately, the mine is now running fairly steady with several sets of men employed.

NO 2. SLOPE, SPRINGHILL.

In August a Tunnel 6′×6′ was started on the West Level 350′ from Slope Bottomer, this Tunnel is supposed to cut several valuable seams of coal underlying No. 2, distance at present driven 60 feet.

I have the honor to remain,

Yours very truly,

M. BLUE.

CAPE BRETON COUNTY.

The sales from this county amounted to 1,390,596 tons, compared with 1,321,653 tons in 1897. The out-put was almost entirely from the Dominion Coal Company, which raised 1,155,311 tons, and the General Mining Association which raised 273,904 tons. The sales in Nova Scotia showed a small increase, as do those to Newfoundland. The sales to Quebec were 822,611 tons against 773,602 tons during the preceding year. I append the report of Mr. Neville, D'y. Inspector, in which a description is given of a "crush" on the Caledonia Mine. These crushes rise in many cases from allowing too large an acreage to stand on pillars. The subject of too great an extension of pillars was dwelt upon in a recent report made to you, and it is to be hoped that the matter will receive in Cape Breton that attention already bestowed upon it in Pictou and Cumberland Counties.

E. Gilpin, Jr., Esq.,

Deputy Commissioner and Inspector of Mines.

Dear Sir,—I beg leave respectfully to submit my report to you of the coal mines in Cape Breton for the year ending September 30th, 1898.

DOMINION NO. 1.

The levels and deeps have been kept going pretty steadily during the year. They are as follows:—North deeps have been driven down seven hundred and thirty-five feet, making a distance of four thousand three hundred and thirty-five feet from pit bottom, also the south deeps were driven five hundred feet making a total of three thousand feet. No. 2 south level was driven twenty hundred feet. No. 3 ditto three hundred and eighty feet, No. 4 ditto nine hundred feet, No. 5 ditto eleven hundred and No. 2 north four hundred feet. The travelling road mentioned in last year's report has been finished early last spring and is a great convenience to the colliery. The door that you gave instructions to have placed between this colliery and Bridgeport on the travelling road, in case of an explosion, has been put in substantially with thick sills and strong mason work. The back south deep has been widened from eight to twelve feet in width in order to give more freedom to the air to go through. The airway at the bottom of the fan-shaft has been straightened and made larger, which has improved the ventilation very much. On the surface the picking belts and shaking screens have given good satis-

faction. During the season a line of new six inch pipe has been laid a distance of three thousand three hundred feet from Bridgeport to this colliery, which gives a good supply of water to the miners' houses and the colliery.

OLD BRIDGEPORT.

The south deeps have been driven down nine hundred and sixty feet from where they intersected the main slope from the Reserve mine mentioned in my last year's report and a section of rooms opened. Eight Ingersoll coal-cutting machines are at present employed in this section of the mine. The remainder of the places are worked by hand-picks, also a few of the pillars on the south side of the deeps are at present being extracted. On the north side of the pit the deeps have been driven down about thirteen hundred feet below the old water-level that leads to the sea shore and rooms broken off going north and south. This district is altogether worked by coal-cutting machinery. A landing was made at a point seven hundred feet down from the water-level and the coal is taken up the deeps to the shaft by a small Jenks engine with 8″ cylinders 12′ stroke and 2 drums 4 feet diameter each and geared 5½ to 1 and worked by compressed air. A new reservoir has been made this year about two hundred feet below the old one, having a capacity of about ten million gallons of water, also the old reservoir has been made much larger by raising the overflow, and about five acres of land have been cleared and grubbed in order to make standage.

INTERNATIONAL.

In this mine levels and headways have been extended in the ordinary courses of working and rooms broken off. The endless haulage has been extended in the bottom south level by driving a curved road connecting the deep and the level. A Lancashire boiler has been set up at the borehole and a new shed built over it. This boiler is now supplying steam to the pump at bottom of borehole, and the exhaust steam instead of going down in the lodgment (thereby injuring the roof) is now led up to the surface, giving good results. Also a trestle has been built in front of the boiler shed enabling a locomotive to run the cars up and empty the coal at such an elevation that it will run directly on the plates in front of the boiler where it is used. A rotary screen has been put up on the bank head which separates the slack coal into four different sizes, replacing the ordinary bar-screens which were used for that purpose. I may say that the ventilation is good, the pit well timbered and the regulations of mines act well observed.

RESERVE MINE.

The improvements at this Colliery during the year are as follows: An air compressor which formerly worked at Gowrie

Mines was set up and runs six Ingersoll coal-cutting machines, four pumps and one small endless haulage engine. A range of pipe from the compressor to the machines, of the following size and lengths, were laid: 100 feet of 7 inch standard pipe, 2,500 feet of 5 inch, 700 feet of 4 inch, 600 feet of 4 inch and 1,000 feet of 3 inch pipe. The above mentioned haulage engine was also put in place, which drives an endless rope 6,600 feet from No. 1 South Level, doing away with horse haulage on that road. A telephone was put down 4000 feet, which connects the French Slope with the office and bank-head, which is found very convenient. The deeps on the French Slope were driven 500 feet and a level started near the bottom, going North and South, which are 340 feet and 320 feet respectively, on which landings are being made. A water level is started down towards Dominion No. 1 in order to carry the water that way. It is at this date driven about 260 feet and No. 1 South level 220 feet. All the above improvements were in the East side or French Slope. Nothing of importance has been done in the Main or West Slope except the ordinary workings and extraction of pillars, which has been very successfully and carefully carried on.

HUB COLLIERY.

A few rooms to the rise of the North Level, leading from the shaft, have been working, but nearly all the coal that has been raised this season has been taken from No. 1 and No. 2 landings on the deep. On the 15th of March last the deeps, that were standing idle for some months, were again put in order and work resumed. Coal cutting machines were put in to drive them, and it was found that they did better than the hand picks. On the 31st of October, 1898, they were driven down 2,256 feet from the shaft level and out of this distance the deeps are from land to the face of the deeps 1,264 feet. Very little more water is showing as they advance than where they went under the sea at first.

The dip seems to be more regular than usual, not being so many rolls in the bottom. The coal looks well. A Champion fan was erected near the up east pump shaft, which gives good results. All necessary repairs have been made and mine-machinery, ropes, etc., kept in good order, pit well timbered and ventilation good all through.

CALEDONIA.

On the surface an additional Babcock Wilcox boiler (water tube) has been added, making a battery of 4 of these boilers in all, or 800 horse-power, which gives sufficient steam for the efficient working of the Colliery. Air hoists have been added to the screening and loading apparatus for the raising and lowering of the shoots leading into the cars, which very much facilitates the handling of the output, avoiding much of the breakage of coal which accom-

panied the old method. Underground the endless haulage in the West level was extended 2,500 feet, making 11,880 feet of rope in this level. In the West deep level it was extended 2,500 feet, making 9,424 feet of rope in this level. In the East deep it was extended 300 feet down the new lift and a branch carried from same rope into the East level of this deep 2,000 feet, making 10,610 feet of rope in this deep and level. This makes 32,000 feet of rope in this Mine used as endless haulage and driven by one 23″ × 42″ engine on the surface, the ropes being conducted down the shaft. The East deeps have been completed and the West and East levels started away from them. The West deep has been driven down 900 feet and a small air engine placed in the Mine to hoist therefrom. All levels are being steadily pushed ahead.

The underground stables have been made larger. They are lighted by electricity, as is also the shaft bottom and parts of the main haulage ways.

In January of this year, an old section or district of this colliery known as No. 4 West East deep, started to cave in, crushing the pillars and timbers all over the section, in places forcing the pillars into the pavement. It was feared for a time that it would cross the East deeps, extend into the adjoining district, and thereby lose one side of the mine, so that very prompt and efficient action was called for. A force of 100 men was provided with safety lamps, and put to work timbering outside and withdrawing timber inside to try and stay its progress. Several times the timber-barrier erected to stay its advance was crushed, and the force withdrawn to a place of safety. Fortunately with the assistance of a barrier pillar and many strong timber-packs and timber, 'twas stayed, and the main deeps and haulage-ways saved. The men worked in gangs of 50 at night and 50 by day for 20 days, before it was considered safe. While the men were at work, capable and experienced men were kept in advance of them, and skirting the crushed district. Considerable displacement and damage was caused on the surface by the earth's subsidence. In Nos. 4 and 5 Section East side, where, in the years 1895 and 1896, that section was dry and somewhat dusty, during the past year, no signs of dust of any account is to be seen, this place being quite damp.

NEW CAMPBELLTON.

The Slope has been extended three hundred feet, from the bottom of which levels have been turned off North and South, the North 100 feet and the South 60 feet, and rooms broken off. The level of the lift above has been extended North 250 feet and South 100 feet. The travelling way has been much improved and the greater part of the Slope retimbered. The Northey pump that was stationed at the upper landing has been placed in the low lift, where it delivers the water to the upper level, thus doing away with the small pump that was below and the necessity of

the pumps at the upper landing. A 12-foot Sturtevant fan has been put in operation near the top of the up-cast furnace shaft. It is driven at present by a belt from an engine near by, which did fairly well, but the management intends before spring to have the engine working direct, which will give better results. The hard, bright-looking coal, somewhat resembling cannel coal, as mentioned in my last report, is still showing through the seam. There have been 12,853 tons of coal mined, and 100 kegs of powder, each containing 25 lbs., used in blasting that amount of coal. There has been shipped this season from the Dolomite Mine 1,400 tons.

SYDNEY MINES.

This Colliery, as usual, has worked steadily during the year. Ten new 6-ton coal cars have been added to the stock, also 8 new workmen's houses. A new haulage engine has been erected on the surface to take the place of the underground North side haulage engine, the ropes from which are taken down the shaft over 60 in. pulleys. This engine has two horizontal cylinders 16 in. diam. × 30 in. stroke, geared $3\frac{1}{2}$ to 1, two drums 6′0″ diam. × 2′2″ wide, friction clutch gear and brakes It will haul coal from a distance of more than $1\frac{1}{4}$ miles from the pit bottom. Another Lancashire boiler 28′ long x 7′ diam. has been added to the stock, completing a battery of five Lancashire boilers in all.

In the pit the main deeps North and South have been extended 1,000 feet and 900 feet respectively. A double road has been made from pit bottom leading south for a distance of 2,300 feet to where the roads leading from No. 4 and No. 1 districts meet. A telephone has been put in connecting the pit bottom with the engine-house on surface. One double cylinder friction drum winch 7 in. x 10 in., gear 5 to 1 drum 26 in. diam. x 24in., has been put in to work South side secondary haulage. This winch is placed one mile from the pit-bottom in the South side workings and operated by compressed air.

The new shaft that this company commenced to sink in July last year reached the coal on 21st July last at a distance of 472 feet from the surface. The seam of coal passed through at this point is 4′ 4″ thick. The intention is to sink still further to test an underlying seam presumed to exist some 200 feet lower down. In the sinking of this shaft from the commencement every precaution has been taken for the safety and protection of the workmen throughout, both in ventilation and otherwise.

NORTH SYDNEY MINING CO.

There have been no improvements worth while at this Colliery since my last report. The level has been advanced about 300 feet and the outside part of it widened and straightened in order to take

the water from the travelling road. Rooms have been extended in the ordinary course of working. A furnace has been built at the top of the airway mentioned in last year's report.

BROAD COVE.

There has been this year erected a carpenter shop 30 × 25 feet, a forge 25 × 18 feet, an engine house 30 × 25 feet, and an air compressor set up 22″ × 18″ driven by a 100 horse power boiler. The level on the West side of the brook in the seven foot seam has been driven 500 feet, making a total of 900 feet from entrance. A back balance has been driven to the rise and connected to an adit-level at the mouth of which has been erected a furnace of 36 feet grate area over which a cupola is built. This furnace was not in operation during the early part of the season, but is at this date ready for use. On each side of the balance there are five rooms opened out, making ten in all. On the inside of the balance, broken off the level, are ten rooms, which are driven at an angle half across the pitch of the seam. These rooms are worked by the coal cutting machines of the Sergeant and Ingersoll type. The method of working is bord and pillar—bords 20 feet and pillars 12 feet in width. The seam dips about one foot in seven.

An angle drift from the upper level or horse road has been driven up through the measures, along which the coal is to be drawn on to a bank-head which has been erected and screens put up in order to clean the coal. A large and commodious boarding house has been erected for miners near the mine, and some cottages near the harbour. Quite a lot of work has been done at this harbour during the season. A new breakwater 350 feet, has been built on the West side of the channel, and the one on the East side has been extended 100, feet and the channel inside the breakwater has been piled in as far as the mouth of the lake.

There have been quite a number of accidents in the above named Collieries during the year. Some I regret to say fatal. All of which you are aware, as you have from time to time instructed me to investigate and inquire into their cause.

It may not be out of place for me to say, that in almost every case except one or two the cause of the accident was through neglect or carelessness on the part of the injured. One or two I will mention. One case in one of the Collieries is when the pit stopped work at dinner hour, a door keeper left his post and went a distance of 1,400 feet in order to get a ride on a full box of coal coming back, and in trying to get on was caught between the coal box and pillar causing his death. Another case is in another Colliery where a boy left his post and in trying to get on a full trip of coal wagons, coming from the deeps, he fell and the trips passed over him causing death, nothwithstanding that riding on the trip was strictly forbidden in that Colliery. In other cases where miners have been

caught by falling coal, the cause was that they did not keep up the sprags although told to do so.

During the latter part of the season some prospecting has been done on the Moseley area at Cochran lake, east of Sydney. In order to prove the continuation of the seam along the crop line, two or three bore-holes were put down which proved very satisfactory, also another trial pit was sunk about four hundred feet east of the pit mentioned in your last year's report. I visited the ground and saw the place. On the surface there was about four tons of coal which had been taken out of the little shaft. It looked remarkably well for crop coal, with scarcely any sulphur showing in it. The seam showed 6 feet 1 inch in thickness from roof to floor stone. The top part is 4 feet 6 inches without a parting, then there is 1 inch thick of a clay or splint parting. Next is coal four inches, and below this is six inches of soft blue clay mixed with coal and at the bottom there is eight inches of good looking bright coal. In all probability this six inches of clay will disappear to the dip of the seam.

On my return from Broad Cove, October 19th, 1898, on the west side of Lake Ainslie, I found there a man named S. S. Creese from Pennsylvania, prospecting for oil. He gave the name of the gentlemen who had him employed as Nawen and Gaston, Roxbury, Boston. A bore-hole of four and three quarters in diameter was being put down, operated by a 15 horse power engine. Boring commenced there about the 20th of April, last and on the 19th October the hole was sunk to a depth of 2240 feet. At a depth of 1600 feet, salt water was struck and still continues to be as salty as when struck at first. A quart of it when boiled down gives three ounces of salt. He says that the sands that he has bored through look as well as the oil sands bored through by him in Pennsylvania. After boring 20 feet more, he says he will leave the present hole and go more southerly and put another where he expects to strike the oil looked for.

On the 25th day of November, 1897, I visited Gowrie, and travelled the extreme parts of the pit such as deeps, levels and headways in order to see if surveys were made before the pit was abandoned and allowed to fill with water. Also on the 12th day of February, 1898, did the same at Victoria and found that in each mine surveys had been made and marks put in at the face of the deeps, levels, headways and balances, and the same put on plans in the Dominion Coal Company's office.

I have the honor to be, your most obedient servant,

P. NEVILLE,

Deputy Inspector of Mines.

MISCELLANEOUS.

In Mr. Neville's report will be found a description of the work done last year at New Campbellton, Victoria Co., by the Messrs. Burchell; and at Mabou and Broad Cove, Inverness Co., by the Broad Cove Coal Co. and others.

Some more exploratory work is said to have been done on the new seam, referred to in my last report as having been opened in the rear of Cow Bay. Areas at Cow Bay owned by Mr. Copeland and others were purchased by the Newcastle-on-Tyne Coal Syndicate, and preparations made for sinking. The False Bay coal areas were also purchased with a view to development. Elsewhere there has been little interest shown in coal work.

At East Bay, in Cape Breton County, Mr. W. N. Young has continued developing the oil shales. Reports by experts show the products of these shales to be of very high quality. It is expected that operations will shortly be undertaken to work the deposit on a large scale.

Accidents during the Year, Ending Sept. 30th, 1898.

DATE.	MINE.	NAME.	AGE.	OCCUPATION.	REMARKS.
Nov. 10	Dominion No. 1	Robert Way	20	Driver	Leg broken by runaway wagon down the deep haulage road.
Dec. 10.....	Sydney	John Boutilier	59	Miner	Fatally injured by fall of roof stone.
Dec. 10	"	John Jones	25	Miner	Slightly injured by fall of coal.
Dec. 10.....	Dominion No. 1	Dan. A. McNeil....	20	Laborer	Arm broken between two coal wagons.
March 10....	Sydney	William Moncrief ..	54	Miner	Seriously injured by fall of roof stone.
March 17....	"	Thomas Toomey....	32	Miner.....	Hurt by fall of roof stone.
May 17	"	William McInnis ..	35	Miner	Slightly injured by fall of coal.
June 2.....	"	John Quinn...	50	Miner	Slightly injured by loose coal from junk.
June 3.....	"	John W. McDonald..	12	Spragger	Fatally injured; caught between full trip and a prop.
June 13.....	"	James Way.....	45	Miner	Seriously injured by fall of coal.

June 14.....	Sydney	Alfred Brown.....	16	Trip Runner.....	Thigh broken, caught between trip and a prop on the Deep road.
June 16.....	Dominion No. 1.	Fred. McNeil	21	Loader.....	Fatally injured by fall of loose coal on him.
July 10.....	"	Dan. R. McNeil	22	Loader.....	Slightly burned by gas.
July 27.....	"	Archy Gillis	49	Shot Firer.....	Seriously injured by shot going off while tamping.
July 27.....	"	Alexander Edwards.	21	Miner.....	Slightly injured by shot going off while tamping.
Aug. 29.....	Bridgeport	Eli Crowly	26	Shift Man.....	Killed by fall of roof stone.
Sept. 1.....	Dominion No. 1.	Neil Campbell.....	13	Doorkeeper.....	Seriously injured, caught between coal box and pillar.
Sept. 2.....	Sydney	Dan. McIntosh.....	13	Roller Oiler.....	Killed, fell under trip whilst trying to get on for a ride.
Sept. 3.....	Bridgeport. ...	Pearce Corbitt	16	Driver	Jaw bone broken by a piece of roof falling.
Sept. 28.....	Dominion No. 1	George B. Batten....	27	Loader.....	Foot badly crushed by lump of coal.

Cubic Feet of Air Per Minute Circulating Through Cape Breton Collieries, Year Ending September 30th, 1898.

MINES.	Oct.	Nov.	Dec.	Jan.	Feb.	March.	April.	May.	June.	July.	Aug.	Sept.
Campbellton	9800	9900	10005	.....	9000	8900	.....	7980	7000	7900	.....	20000
Victoria	58000	59060	50000	.....	40000	.....	.....	.....	.....	.....	.....	.....
Hub	24500	24000	.....	.....	.....	24000	21100	21000	32980	48000	40000	41200
Reserve	142500	145000	150000	90500	605000	75100	75600	149200	155000	115000	137250	137690
Caledonia	75000	87900	75000	75000	50000	67800	71000	87500	70980	58500	71110	72100
Gowrie	25000	1500	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dominion No. 1	86550	90660	80000	78100	38100	60000	60200	63050	73100	72510	60150	72500
International	87100	65840	59900	55000	35000	61900	55000	60500	63000	72110	67000	70900
Bridgeport	51200	57291	50000	40200	30500	51000	49200	75540	65500	64100	60100	65290
Sydney	76540	70209	72403	79955	87628	84391	83091	85535	92438	84098	74850	83872
North Sydney Mining Co	4000	3200	6500	4000	5000	6500	6730	6501	5990	4000	5200	8000
Broad Cove	.....	.....	.....	.....	.....	.....	.....	.....	.....	10000	.....	6950

Date of Inspecting, Mining Year, Ending Sept. 30th, 1898.

MINES.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.
Campbellton	9	.....	9	.....	17	8	.....	25	17	9	.....	22
Victoria	12	30	6	.....	12	.....	.....	.....	.....	.....	.....	.....
Hub	13	15	.....	.....	.....	15	12	5	21	22	20	9
Reserve	14	19	7	14	11	18	20	14	24	14	25	10
Caledonia	15	16	13	15	19	12	19	6	22	23	4	15
Gowrie	16	25	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dominion No. 1	18	17	18	25	5	21	14	17	16	5	24	12
International	19	29	27	24	22	19	28	23	23	6	26	14
Bridgeport	20	18	24	13	7	16	21	11	15	7	23	13
Sydney	26	27	11	21	10	2	6	20	18	16	17	17
North Sydney Mining Co.	27	27	26	22	8	3	7	21	28	15	16	16
Broad Cove	.....	.....	.....	.....	.....	.....	.....	.....	.....	12	.....	28

Memo. showing quantity of powder used, and No. of tons of coal produced therefrom during the year.

Mine.	Lbs of powder.	Tons of coal.
Sydney	42,609	273,903
Caledonia	40,580	258,409
International	11,236	102,386
Dominion	53,500	285,109
Bridgeport	28,575	150,210
Reserve	41,298	247,092
Hub	7,866	74,809
Campbellton	2,500	12,853
Broad Cove	1,250	9,000

GOLD.

The returns for the year ending Sept. 30th show that 31,104 oz. 17 dwts. of gold were extracted, as compared with 26,963 oz. 14 dwts. 2 grains in 1897. The returns for this year are fairly up to date

The following general summary shows the yield by districts:—

GOLD—General Statement for the Year Ended Sept. 30, 1898.

DISTRICT.	Days' Labor.	Tons Crushed.	Average Yield of Gold per ton.			Total Yield of Gold.		
			Oz.	Dwts.	Gr.	Oz.	Dwts.	Gr.
Malega Barrens	.....	1200	1	14	....	2040	....	...
Brookfield	16442	1112	... .	6	22	3854	18	....
Waverly	1560	807	.....	12	12	504	13	11
Oldham	.....	631	2	2	3	1329	9	14
Sherbrooke	45828	16891	.....	6	3	5201	4	10
Caribou	14416	6188	.....	3	21	1201	7	19
Lake Catcha	3908	406	.....	19	12	396	16	11
Millipsigate	9934	3421	.....	9	12	1631	1	....
Gold River	155	201	3	6	5	667	13	23
Kemptville	3049	228	.....	9	15	109	15	5
Stormont	50374	34817	....	4	16	8386	17	2
Fifteen Mile Stream	10499	3495	.....	4	19	537	....	....
Killag	.....	355	1	11	8	556	8	....
Uniacke	12221	1899	.....	18	17	1779	6	23
Tangier	1605	1134	1	3	15	1341	....	....
Wine Harbor	2082	637	.....	3	13	113	5	17
Montague	11429	1992	.....	4	8	199	8	10
Other Districts	3810	917	.....	12	13	1254	10	23
Total	186812	86331	.....	....	....	31104	17	...

REPORT FROM MR. D. WETHERBE.

MINES OFFICE, HALIFAX, Oct. 20th, 1898.

TO DR. GILPIN,

Deputy Commissioner and Inspector of Mines:—

SIR,—I beg to submit the following report of my visit to the Gold Mines east of Halifax:—

I visited Tangier Gold District on Aug. 2nd, 1898. This district which has practically remained idle for a number of years has again assumed an air of stir and bustle.

The Tangier Gold Mining Co., under the temporary management of Chas. McClair, is in active operation on the "Leary," "Murphy-Turin," and "Nugget" leads, and employs 52 men. On the "Leary" lead at the western end of the property two shafts are sunk, the East one down about 160 feet. The engine house situated in close proximity to the shafts contains a 30 H. P. Robb Engine which is used for hoisting and pumping. The latter is done by means of a cornish pump. The lead here is between 4 and 7 inches thick and looks extremely well.

I found the shafts to be fairly well timbered in the new workings and with platforms at the proper intervals. It would be as well to have "lagging" or a casing of some sort placed to separate the ladder way from the rest of the shaft.

There are also in operation two shafts on the Murphy-Twin leads and one on the Nugget lead at the East end of the property. The shafts on the former lead are down about 48 feet. Over 100 feet of ground has been stoped out from the West shaft. The Murphy and Nugget leads are about 4 and 3 inches wide respectively. More or less work has been done on several shafts close to above workings; but the intention now is to sink one main vertical shaft from which when cross-tunnels have been driven all the hoisting will be done. In fact this shaft has already been commenced.

At present engines are in use here for hoisting, but a large and well equipped hoisting and engine house is now in course of erection. It is situated over the mouth of the new shaft and will be fitted with a shoot and ore-bin. A trolley-way will convey the rock from here to the mill, some hundred yards to the eastward, and on lower ground.

It has been remodelled and ten additional stamps having been put in, twenty will be constantly be kept going. This mill was formerly run by water power and could be yet if more head was given, which is quite possible. A good rock-breaker is in use here.

As the workings at this end of the district can supply all the stuff necessary to feed this mill, the erection of another 20 stamp is in contemplation by the Company, probably at the West end of the property to be supplied from the Leary and other leads. Concentrators are also being talked of.

The anticlinal is well defined and several of the leads have been cut on the North dip. It curves to the northward at Strawberry Hill and the river. Faults have been located at several places.

MOOSELANDS.

Tangier District, The Arlington Gold Mining Co. I. H. Treen has been acting as manager of this property, which was recently secured by the above company from Mr. Yeadon. It was formerly known as the Sagar-Musgrave block. J. Reynolds, foreman, with 8 men employed.

At present they are working on an angular which crosses the workings on the Lake lead. The old workings on this lead were prosecuted by means of an open cut, but now a shaft on an incline to the west of about 45 degrees has been sunk on the lead which dips almost perpendicularly, and both the angular and lead are being worked, providing about 7 ″ of crushing material. Part of the ladderway should be renewed and more timbering is required. An engine is used for hoisting. The property contains an old 4 stamp mill run by an upright engine. This had been employed satisfactorily for a test lot; but was not crushing when I was there. A considerable amount of development work has been done in former years on several leads on this property, and with capital and systematic development I should say that this would be a most promising district.

MOOSE RIVER.

Caribou District, Aug. 25th, '98, Touquay Gold Mining Co., J. A. Fraser, manager. A. Jennings under foreman, 20 men employed.

Mr. Fraser had only been there about a fortnight when I visited the mine and was about to take out a test lot from the Little North lead. The shaft on this lead in which they are at present working has been extended till it is now down about 200 feet, while the other shafts on this lead are idle. A poor chance was afforded to properly see this mine as the steam was escaping from the pumps and rendered artificial light of little use. Underhand stoping is the method of working used.

The shaft wants widening badly, the hot feed pipe, in places, running over the ladders, which also need a thorough overhauling. No platforms are in position in the shaft, but both Mr. Fraser and the foreman tell me that these faults will be remedied.

Work is also being done on the Brittania lead in which a Rand drill is being employed. This is a wide belt over 7 feet in places, I believe. The mill is situated on the river and contains 15 stamps. Two frue vanners are being put in to save the concentrates.

Moose River Gold Mining Co. A. McGregor is manager for this company and has 8 men on. He is prosecuting a "wide cut" or quarry working on a belt upwards of 20′ thick. The workings are down about 60 feet and everything in the belt is being crushed

This is an extremely cheap mode of working, and this is a necessity here as the stuff crushed gives under $2.00 per ton.

A ten-stamp water-power mill is in operation.

Colonial Gold Mining Co. J. K. Pearson, as manager, has 5 or 6 men employed. They are opening a quarry working, which when prosecuted some distance further East will cut several veins which have been opened by shafts in a few places. He is crushing surface slate and all.

The striking feature of this property as yet is the mill which is just completed and has ten stamps. Ten more are shortly to be put in, and space left for about 40 more. Mr. Pearson has introduced here a unique and somewhat original system of plates and trap. The former have cross-grooves at top and bottom. They are 12 feet long, and to avoid a common fault they are set at not too steep an angle. In the trap at the bottom, the tailings are thoroughly stirred as the water enters from below. They are then to be caught and roughly concentrated by a canvass shaking table placed at the end of the sluice.

The river runs within a few feet of the mill, and two tanks are built here to keep a plentiful supply of water for the mill and boiler. These are supplied automatically from the river, and a third tank is placed up stairs in the mill.

Two engines of 75 H. P. each (built in Galt, Ont.,) are used. The mill building is flat-roofed and of two stories. It is very roomy. A comfortable company's dwelling house has also just been finished.

A certain amount of prospecting on a small scale has been going on in the district, and Wm. Reynolds has opened two very nice looking leads.

Caribou Gold District, Elk Gold Mining Co., Fred. Darragh manager, Alex. Cameron under foreman.—With the exception of a little work about the mill and the pumps being kept going, very little work was being done here, though I am told 14 men are employed.

I went all through the workings and found them to be very irregular, being broken with faults and the shaft very badly sunk. It is down about 300 feet.

The belt averages about 6 feet in thickness. I think very little work has been done since last year and if the Mine is to be worked safely the advice given at the last inspection of leaving pillars will have to be followed. The timbering is only fairly good and the Mine exceedingly wet. Underhand stoping has been the practice in working.

A Cornish pump has been employed to take the water from a dam part of the way down, and an auxiliary pump goes to the bottom.

The mill contains 10 stamps, and a 30-h. p. engine is in use.

Guffey-Jennings Gold Mining Co., H. Guffey, Manager, Joe. Pascoe, foreman; 17 men employed.

This company was not mining when I was there, but a vertical shaft was being sunk to meet the end of the old workings which are to a depth of 130 feet vertical, and 300 feet at an angle of 35°. This new shaft is down already 400 feet and they expect to strike the belt which contains about 14 feet of crushing material, at a depth of 470 feet.

The shaft is 10½′ x 4′ and very well timbered; larged squared and smoothed timbers being used. The ladderway is good, though the men generally travel on the tub. Cages are to be used eventually.

One Rand (Little Giant No. 3), air drill is used and gives great satisfaction. A ten stamp mill is on the property but this will probably be augmented when crushing commences. A large steam pump is used to handle the water, though the mine is not particularly wet.

The works are lighted by electricity.

FIETEEN MILE STREAM.

New Egerton Gold Mining Co., G. F. McNaughton, manager; L. McLean, underground foreman. Twenty-five men were employed when I visited the property and little mining of any consequence was being done.

The large quarry working which was begun last April, was stopped a few months ago on account of a cave in as the workmen reached the old workings below them.

In the face of this quarry can been seen all the belts and lodes on which the old workings were sunk. They are now sinking a vertical shaft just west of the quarry and have already reached a depth of 130 feet. This shows great industry on the part of the management as ground was only broken about the middle of July.

They intend sinking to a depth of 150 feet, when drifts East and West will be begun, the former to meet the old workings.

The shaft is the largest I have yet seen in our gold fields, being 8′ × 18′, and well timbered. It is also very dry, no pumping being necessary as yet.

One Rand and one Ingersoll drill are employed and give great satisfaction. The belt they are now sinking on is between 16′ and 18′ thick.

The property contains two mills, both of which were crushing when I was there.

No. 1 is a 20 stamp crusher, run by water power. No. 2 has 30 stamps, 15 facing each way. Part of the plates in this mill are fitted as shaking tables.

The buildings are lit by electricity and present an up-to-date appearance. A Matheson engine of 80 horse power is used in No. 2 mill. It also supplies power for the Cornish pumps, which are kept going in three old shafts.

A Ledgerwood overhead cable is employed instead of the old tramway and gives every satisfaction. It is capable of carrying 200 tons per day, an amount far in excess of the requirements of the 30 stamp mill which it supplies.

The road to this Mine is in a shameful condition for over 18 miles.

SALMON RIVER.

Dufferin Mine. The Montreal-London Gold and Silver Development Company, B. McDonald, manager, Alex. Dick, assistant manager, T. Lindsay, under ground foreman. About 160 men and boys employed.

After two years' idleness, through litigation and other causes, this mine has been re-opened by the above new company, who are putting in by far the most extensive equipment yet seen in the province. Indeed, I am informed that before crushing commences, over $100,000 will have been expended in buildings, machinery and development work.

A considerable amount of work has already been done underground as follows:—The old main shaft on the south dip of the "saddle-back vein," so-called, is now down 330 feet at an inclination

of 54° for 250 feet, and then 65° to the bottom. This shaft has been enlarged to $15 \times 8\frac{1}{2}$ feet to allow room for two skip slides. It is also well timbered. A vein folded in anticlinal form beneath the outcrop of the anticlinal has been cut off at its apex by a cross-tunnel driven North over 90 feet from the bottom level.

This cross-tunnel was also driven South, and at a distance of 26 feet a slate-belt was encountered, well mineralized and showing free gold.

Another slate belt showing numerous sights in the working face was struck by the tunnel. This tunnel is to be extended north and south across the strata to cut other veins and belts. But by far the most important work being done is the sinking of a vertical shaft on the outcrop of the apex of the anticline.

This shaft is already down 260 feet and the intention is to sink 1000 feet and cross-cut. The shaft is divided into three compartments for cages, skip and pump and is well timbered with large squared timbers. The sinking of a shaft to this depth shows great enterprise on the part of the company, and will be watched with interest by the miners of the Province, as it will determine (in this district, at any rate) whether the lodes continue in size and value as they descend below the superficial depth to which the majority of our mines have been worked in the past.

Above ground the work has also been rapidly pushed, and already a new shaft house of ample proportions, commodious offices, engine and boiler house, machine and work shops, and the foundation of a 60 stamp mill are about completed, and the company expect to crush by the end of November. At present only 30 of the stamps are to be put in, though the beds for the others are in position.

The mill tailings and a considerable quantity of the "black rock" on the dumps at this mine contain a large proportion of sulphides of lead and iron and especially of arsenical pyrites. Galena and traces of copper are also contained in them.

To save the concentrates which run high in gold, two Frue vanners to each 5 stamp battery are to be put in or 12 vanners in all for the present as the company is only commencing with 30 stamps.

The crushing material reaches at certain points a width of 25 feet or more, but the average is much below this, say 7 feet throughout.

All the hoisting is to be done by means of the vertical shaft, and the ore being taken to the top of the shaft house and bin will be carried through a shoot and rock breaker, (Blake) to the batteries which are situated at a convenient distance from it.

The engine room contains 2 Ingersoll air compressors which supply the 6 drills used in the mine. Three 60 H. P. Cooper boilers supply the double condensing Corliss englnes used for hoisting, etc., and the compressors.

All the minor repairs will be done in the machine and workshops at the mine. Two Cornish pumps are being worked by endless ropes, the powers being given by the river.

A 140 lamp dynamo supplies the building electric light.

The property also has on it a 20 stamp water power crusher, and a company's store is shortly to be erected containing reading rooms for the men.

GOLDENVILLE.

Blue Nose Gold Mining Co. A. G. McNaughton, manager, Gardiner McKenzie, underground foreman. Seventy men are employed in this and the New Glasgow property which are under the same management. Two shafts are being operated, one 200 feet on the South Belt and one 250 feet on the Springfield. Stoping has been done on each of these belts for several hundred feet. A crosscut was being driven at the time of my visit.

The mill has 20 stamps in a new comparatively new building and is run by a 45 h. p. engine. Two air drills are employed, and the hoisting is done by steam. The mine is well timbered, and not particularly wet. A cornish pump handles the water.

New Glasgow Co. This being under the same management, employs J. C. Mason as underground foreman. Work is being done on two leads, the "Striker" and "Canada." On the former a shaft is down 165 feet and on the Canada two shafts are sunk nearly 200 feet. The lead is about 6″ in width. The timbering is fairly good in this mine with the exception of a few places where wooden wedges have been used in the headings. Three Rand air drills are in use by day and two by night. Five auxilliary cornish pumps are used in the several old shafts.

The Palmerston Gold Mining Co., G. A. Hirschfield manager.—About 25 men employed.

A small amount of work is being done on two shafts on the Palmerston lead, but the Mine seems to have been worked in a very unsystematic manner. More care should be taken with the ladderways.

Two new shafts have been opened to the Southward, one 20 feet and the other 75 feet deep. The hoisting is done by wyms. The hoisting tub in the latter shaft needs a new fastening.

Sutherland Development Co., Geo. Brackett, manager; J. H. McDonald, underground foreman; 11 men employed.—Work is now being done on the Brazen Serpent lead, which averages over 7″ in thickness. The property contains a 10 stamp mill, run by a 25 h. p. engine supplied by a 30 h. p. boiler. The engine supplies power for hoisting and pumping. A Cornish pump is employed. The ladders need looking to in this Mine.

ISAAC'S HARBOR.

Hurricane Point Gold Mining Co. W. Fancy, manager; R. McCallum, underground manager. About 36 men employed working on a 6″ lead, which in part of the workings is broken by a large fault which rolls and increases the size of the lead.

A 10 stamp battery with rock breaker is contained in the same building as the shaft and the 40 H. P. engine which gives power for the stamps, pump and hoisting gear. Salt water is used in the battery at this mine.

Skunk Den Mine. C. F. Andrews, manager. About 27 men employed. The main shaft is 160 feet deep. At the 40 foot level, a drift is in to the east, 93 feet from which an upraise is being driven to meet an old shaft 30 feet deep. This shaft will be used in future as the main shaft from which all the hoisting will be done. At the bottom level a drift has been stopped 125 feet east. This lead is about 6″ thick. The ladders in this mine need repairing, as does also the splicing of the hoisting rope. The timbering is fair. At present a 5 stamp mill is in use run by a 14 H. P. engine. This also does the hoisting and pumping, but not at the same time. Coal is used as fuel. A new 10 stamp mill and engine house is shortly to be built.

The Griffin Gold Mining Co.'s Mine is idle, though a test lot has lately been taken out, I am told.

The Richardson Gold Mining Co., at Goldboro. A. B. Cox, manager; Wm. Welsh, under manager; 75 men employed. As is well known, this belt is being worked on the bend of the Anticlinal. Three shafts are down, one on each dip, and one on the end of the Anticlinal axis, dipping to the East.

The South shaft is 240 feet deep, the middle or East 260 feet and the shaft on the North dip is 200 feet down. The belt varies in thickness from 5 feet on the North dip to 18 feet at the bend of the Anticlinal. It has been worked for about 1500 feet in the circular form and to the depth mentioned, everything taken out being crushed.

The timbering of this Mine on the whole is bad. Formerly it was timbered with long piles, and, in fact, is yet to a large extent,

though a few small pillars have been left. On the North dip in one of the upper scaffolds the timbering is extremely bad, wooden wedges being used almost exclusively at the headings, and in only a few places did I see a proper tooled heading in the hanging wall.

The same may be said of all the timbering more or less.

Several falls of rock have occurred, one very serious one at the south side of the main shaft.

I should advise large pillars being left in this mine at frequent intervals as small breaks in the walls occur at comparatively short distances apart. Steam drills are employed in the mine.

A 40 stamp mill is in operation and the Wilfley concentrator is used to save the concentrates, which were about to be subjected to a mill test at the time of my visit. A 150 H. P. engine gives power for hauling stuff to mill, crushing, rock-breaker and concentrator. Electric light is used in shaft, shaft houses and mill and in fact everything above ground is in ship-shape and satisfactory order.

COCHRAN HILL.

No mining work was being done here on account of the burning of the mill some months ago

A new 20 stamp mill is in course of erection, and Mr. H. E. Taylor, the manager, informs me that they expect to be in running order about the middle of October.

FOREST HILL.

Modstock Gold Mining Co. W. J. McIntosh, manager; F. Tunney, underground foreman, 68 men employed. Four working shafts are being worked on a 2″ lead, the deepest down 165 feet. The timbering in this mine is by far the best and most systematic I have yet seen, the headings all being properly tooled and large timbers placed. Engines are used for hoisting, and the water is handled by tubs. The power for a 10 stamp mill is given by a 30 H. P. engine. A Wilfley concentrator has been placed in the mill and good results are expected. Several other leads have been cut on this property though little development work has been done on them.

McConnell Gold Mining Co., J. McConnell manager, 22 men employed.—Working on the same 2″ lead as the Modstock Co., but farther to the Eastward. The timbering is not up to the mark in this mine. Engines are used for hoisting and the wate is handled by tubs. A 10 stamp mill is in operation.

Crow Nest Mine. W. H. Weston, manager, —— Irwin, foreman, 23 men employed.—A tunnel is driven in the side of the steep bluff, easterly, to meet a shaft sunk from a level driven 62 above. The

bottom level is driven 125 feet east of the shaft. Several cross-cuts and levels have been driven, making an extensive working. A trolley track has been laid through the levels, and the workings are lit by electric light.

Four drills run by compressed air are employed.

A 75 h. p. engine gives power for the 20 stamps in the new mill house and the rock breaker (Dodge).

I have the honor to be, sir, yours respectfully,

D'Arcy Weatherbe, *C. E.*,

Mines Department.

Herewith is attached a sketch of the progress at other mines for the past year.

MONTAGU.

In this district *The Golden Group Mining Co.* A. A. Hayward, manager, D. McKaskill, undergound manager, about 30 men employed, have been doing considerable work up till the middle of the present year when they closed down their mine on the Lawson Lode and commenced to open up the Old Annand property to the eastward. A large amount was expended in putting in new plant and machinery, opening up the shaft and refitting the mill which now contains 15 stamps. This work occupied some month's and crushing was to be begun in October. The first crushing at this mine proving unsatisfactory, it was shut down.

Symond Kaye. Under the Messrs. Oland this mine haa been worked in a more or less desultory fashion during the past year.

The lead which paid them so well during the last part of the previous year was lost on a fault; but has since been recovered some distance to the southward. Tributors, crushing in the Salisbury mill, have produced about 100 oz.

Oldham has produced nearly 1500 oz., chiefly by tributing, though I believe Mr. Neily is about to open up the "Bonanza" lead at once. Practically the same may be said of Waverly for the past year.

CHEZZETCOOK.

The first mention of this district appears in the Mines Report for the year 1882, when the Oxford Gold Mining Co. erected a complete milling and mining plant, with the necessary stores, dwellings, etc., and commenced mining operations. Other parties did considerable

work during the same year. In the following year the same Company produced nearly 2500 oz. of gold from 1475 tons of quartz.

In 1884 the Oxford Co. had gone ahead in their development work to such an extent that they were spoken of as owning one of the best mining plants in the Province.

A 10 stamp mill was built during the year 1886 by the Cambridge Company. Work was continued by the Oxford people, who in 1886 discovered a new and very rich lead. Up to the year 1888 over 40 leads had been cut on the Oxford property, and by 1891 the Company had discovered over 100 leads and done a large amount of development work. More or less work has also been done in the district by Jno. H. Anderson, Dr. Cogswell and others. Since the year ending Septemder 30th, 1895, no report has been published by the Government relating to this district, but during the present year considerable development work has been done in a new part of the district and some of the old properties having been re-opened. The prospect for the district appears to be promising.

John H. Anderson has completed a ten stamp mill and is opening up ground of promising character, and will it is expected, make steady and satisfactory returns during the approaching season. There are belts on his and other properties in this district of which are well worth testing, and may prove adapted for large and more durable enterprise than the smaller and richer deposits, hitherto forming the dependence of this gold field.

The returns from this district have not appeared in separate form in the Mines Reports for those years during which the district has been worked only to a limited extent. The total returns show that 21,140 tons of quartz have yield in round numbers 23,153 oz., 18 dwt., 7 gr. of gold, valued at about $450,000.

WESTERN COUNTIES.

The total production of the Gold Mines West of Halifax for the past year was upwards of 6350 oz., of which 3855 oz. was produced by Brookfield, 1755 oz. by Leipsigate and over 600 oz. by Gold River.

This yield appears comparatively small coming from such a large area; but when the fact is taken into consideration that the amount was practically contributed by four Mines and they, with the possible exception of Brookfield, being worked on a small scale, it is nothing to be ashamed of.

A sketch is appended of the progress made during the last financial year at Brookfield and Leipsigate.

LEIPSIGATE.

Cashon-Hines Mine, Capt. John Hines manager, 30 men employed. Considerable work seems to have been done here during the past year. The lead being worked is between 10″ and 12″ in width and rapidly curves to the Northward on this property. It is probably a "fissure" lead.

Three shafts are sunk as follows: The "Mill" shaft is at present 172 feet in depth (of which 72 feet has been sunk this year). Levels have been driven East 40 ft. and West 110 ft.

At a distance of about 700 ft. to the Southwest of the "Mill" shaft are two working shafts 65 ft. apart. (Probably on the same lead.)

No. 1 shaft is 100 feet deep and No. 2 65 ft. Drifting has been done for a distance of 130 ft. West and 193 ft. East of No. 1 shaft. At one point the width of the lead is increased by a roll to about 7 ft.

The course of the lead changes from N. 25° E. at the "Mill" shaft to N. 56° E. at No. 1 shaft.

In June last year a system of rope hoisting was put in at the Western workings. Power for this was given by the mill house engine and provides for a hoist in each shaft and a 1¼″ pump.

Owen Mine.—This Mine, just to the North of the Cashon-Hines, is supposed to be situated on the same lead. It has also been working steadily during the past year and a new, well equipped, 5 stamp mill was erected.

A feature of this district is the production of silver, which, though small, is unique.

A mining road has been built to these mines, shortening the distance from Bridgewater by several miles.

NORTH BROOKFIELD.

Brookfield Mining Co. Ltd. Wilbur L. Libbey, manager, C. W. Crowe, underground manager, 70 men employed. The mine is worked by two shaft one vertical and nearly 500 feet deep and the other about 900 feet at an inclination of 45°. Considerable development work has been done during the past year, and a modern compressed air pumping and drilling plant has been installed which has reduced the cost of mining.

An up-to-date 20 stamp mill and 8 "Triumph" concentrators handle the ore. Care is taken in the amalgamating and the tailings from both mill, and concentrators are continually followed by assays.

The chlorination plant which is capable of handling 16 tons of concentrates in 24 hours, handles the Company's concentrates, and they are prepared to do the same for other mines in the Province at as low prices as anywhere in the world, guaranteeing them 90% of extraction.

The Company has purchased an adjoining property, and commenced work there, putting in a hoisting and drilling plant.

They have been paying more attention during the past year to development work and increasing the ore reserves than in producing large bricks.

D'Arcy Weatherbe, *C. E.*

Mines Department.

December, 1898.

ACCIDENTS.

As far as practicable, accidents at the Gold Mines, during the past season, have been enquired into.

The following report refers to an accident at Montague, March 4th, 1898:—

HALIFAX. N. S., March 8, 1898.

DR. E. GILPIN,

Inspector of Mines.

SIR,—Acting on your instructions I went to Montague, yesterday, (March 7th) to obtain information relating to the accident to Hugh McAskill, at the *Golden Group Mines.* The following are the condensed details:

Name.....Hugh McAskill, Montague.
Occupation.....Contractor sinking shaft.
Date and time....March 4th, 7 o'clock in the morning.
Shaft.....Nugget lead shaft.
Injury.....Ankle broken and body bruised,
Cause.....Slipped down face of sinking, 35 feet.

Account of accident: Hugh McAskill was contractor under the *Golden Group Co.*, and was sinking development work at the bottom of some old work on the Nugget lead. The old workings were 55 feet deep, and at the old level McAskill had put in a platform to protect the workmen in the sinking. The new work had reached a depth of 35 feet. On the old level there were two dams put in to hold back the water that came from east and west. A water-pipe took the water from the west tank to the east tank from where it was pumped. The men running the steam drill on Thursday evening, fired the holes they made and must have loaded heavier than usual, for the blast cut out the platform over the shaft at the old level and disconnected the water pipe between the tanks. McAskill went into the shaft in the morning to see to the work and found the nature of the damage done. He fixed the water-pipe and climbed up to examine the west dam. He jumped down off the dam forgetting at the instant that the platform was broken out. He put his arms out to check his fall. He slid down to the bottom, a distance of 35 feet, and landed on his feet, hurting both ankles, somewhat, but breaking some bones in the left ankle and turning the foot up. He managed to reach the rapper, and got the skip sent down and dragged himself into it and signalled the hoist to take him up. He had to look after himself as he had no rapper signal beyond "hoist," "lower," "go slow." On account of the amount of inflammation of

the ankle before the doctor came, the bones had not been set up to the time of my visit to him. Yesterday the swelling had reduced and he was feeling easier.

The shaft, ladders, safety platforms and hoisting gear at this shaft were in good order. The want of a signal for help was an oversight that should be provided for.

All of which I respectfully submit,

F. W. CHRISTIE, *C. E.*

On the 25th of July a fatal accident occurred at the Dufferin Mine, of which I have obtained the following particulars:—

At 7.45 on the evening of Monday, 25th inst., an accident occurred in the vertical shaft being sunk by the Company, whereby Edward Spencer, chucker, aged 27 years, lost his life. Spencer was acting as assistant to Sylvester Carroll, machine drillman. Carroll was slightly injured. There were four men employed in the shaft at the time and two air drills were at work. The men were drilling the holes for the next blast. Carroll had started a new hole with a four foot drill. It had only gone a few inches when an explosion took place in the rock which they were drilling, with the result stated above.

Immediately after the occurrence of the accident an examination was made of the place. It seemed that in the blast which had been fired on the night shift of Saturday a small piece of dynamite had remained unexploded in the bottom of the hole, and Carroll, in starting a hole near the same place, had drilled into the old one thus causing the explosion.

The Coroner, Dr. McMillan, of Sheet Harbor, held an inquest on Tuesday, at which the jury brought in a verdict that the deceased met his death by the accidental explosion of dynamite, and that no blame could be attached to the management or anyone.

On the 12th September an accident of a similar character occurred at Malaga Mines, on the Parker-Douglas property, by which Robert Devaney and Clarence Boyer were instantly killed. The men were employed on the Parker and Douglas property. They, with two other miners, were at work in the bottom of a shaft 120 ft. from the deck; it was the pump shaft, twelve feet long, and eight feet below the other work. Each pair of men kept their own end of the shaft. On Saturday they had fired five shots in all when they quit work. On Monday morning they hoisted the loose rock from the blasts. The other pair of men got to work first with the drill. They were backs towards the men who were killed, who had struck but a few blows when the explosion occurred. The fact is, that a portion of a charge of Saturday night remained unexploded, and this fact was

unknown to the men. It is most probable that they went to work in the old drill hole, filled with bits of rock, and set off the dynamite by a blow from the drill; either that or they began work near enough to explode it. Some things are always taken for granted, and one of them is, that all the dynamite explodes if any does. This is the rule, and exceptions are too rare to be acted upon.

Mr. Devaney was in charge; he was a careful man, and during a year, in which for much of the time there had been more than fifty men at work, no accident had occurred. Mr. Boyer was a good miner, and not at all reckless. They were men of excellent qualities.

Another accident occurred at Montagu by which James Mitchell lost his life. He was 20 years old and unmarried.

The inquest was held before a representative of the department could attend. From what could be learned it seems the accident took place at 6.20 a. m.

Mitchell, who was on the deck-head, attempted to loosen the rope, which had caught in some way at the bottom of the shaft. The rope parted at the drum, and Mitchell fell 85 feet to the bottom. Some 25 minutes passed before ladders could be procured and he was then found to be under 9 feet of water.

It is doubtful whether death was due to drowning or injuries sustained by falling down the shaft. This accident occurred on the "Iron" lead, which was being worked on tribute by Ruben Holly.

MISCELLANEOUS.

Lead Ore.—The operations of the Cheticamp Gold Mining Co., the past season, have only been of a preliminary character. On the Galena deposit a shaft 16 feet wide, 30 feet across the strata, and 50 feet on the dip, has been sunk, showing ore over the entire walls. Some 200 feet east a second shaft 14 feet wide, 7 feet across the strata, and 45 feet on the dip has been opened up in a large deposit of Zinc Blende, both openings look very promising indeed.

Since May 1st, 1898, when operations were commenced, this company has constructed a road two and a half miles in length, through exceptionally rough country. It has erected a concentrating mill 65 feet in length, by 51 feet in width, two stories high, with an attached power building, 38 feet by 18 feet, which contains a water wheel capable of developing 125 horse power. The mill proper contains aBlake Ore Breaker, two sets of Cornish Rolls, two Elevators, two Trommels, 6 jigs, each of four compartments, and a Rotary Table.

The river from which the power is obtained has been dammed a half mile up stream above the concentrator, and a wood flume 2,600 feet in length, built to convey the required amount of water to a point on the mountain side above the mill, where an iron flume 29 inches diameter, and 190 feet in length, connects to supply the power.

The erection of the concentrating machinery was completed the last week in November, when 50 tons of ore were put through, yielding 10,713 lbs., of concentrates. Upon assaying these they were found to contain lead 25.3%, silver 22 oz., and gold 3 dwt. per ton of 2,000 lbs.

Copper.—There is nothing new to report about the Cape Breton Copper deposits. In Cumberland County some work has been carried on during the summer, and the following notes are from visits paid by Mr. Blue to the different deposits.

On the 25th November, I visited the mine of the Crown Copper Company near Ogilvie's Mills, about 5 miles north of Wentworth Station, I. C. R. A shaft has been sunk to a depth of 50 feet near the edge of a branch of the Wallace River. Some good ore was taken from this shaft, but during my visit, and for some weeks previous, operations were suspended.

CHISHOLM MINE.

The Chisholm mine is situated about 4 miles north of the Crown Company's mine. It is also on the bank of the Wallace River; Mr. C. Holden, manager. A tunnel has been driven in 100 feet from the bank, and 300 feet south of tunnel a shaft has been sunk 60 feet, and a place driven up 85 feet to the rise. A 15 H. P. boiler, hoisting engine and pump have been erected, and the entire plant covered with buildings. The ore in this mine is of superior quality, and is found in a vein of blue clay, about 5 feet thick, which has an easy angle dipping to the south. In the mining the clay is quite hard, of a slaty nature, but after being exposed to the weather a short time, it readily dissolves and copper can be traced all through it.

Work at this mine is at a standstill at present, but the company keep the water pumped out.

PALMER MINE.

The "Palmer Mine" is situated 4 miles southwest of the Chisholm mine and on the West Branch of the Wallace River; Frederick Huestis, manager, and G. M. Spencer, underground manager, 7 men employed working double shift. A breakwater 70 feet long has been built, and the slope extended in the bank of the river 100 feet, dipping to the north. In a vein of blue clay 7 feet thick, copper is found all through the clay, but it is especially rich near the bottom of the vein.

The Chisholm and Palmer Mines are both owned by the same Co. of New York capitalists.

I have no information as to their future intentions, as the promoters are at present away from the Mines.

Oil.—In Mr. Neville's report will be found a reference to the progress made in boring for oil at Lake Ainslie.

Plaster.— The Quarries continued working as usual. The Victoria Gypsum Co. are preparing to open a large deposit on St. Ann's Harbor.

Tungsten.—Some interest was aroused by a statement that near Lake Ainslie a vein had been opened carrying Tungstate of Iron in workable quantities. The vein is stated to be about three feet thick and to yield readily a concentrate carrying over 65 per cent. Tungsten Trioxide. It is stated that 65 per cent. ore is worth, on the continent, £80 per ton.

The demand for tungsten is not large, though it is gradually increasing. It is used as an alloy in making steel, and this is the only use of commercial importance. The supplies at present are hardly equal to the demand. The principal ores of tungsten

are the mineral wolframite (Fe Mn WO_3) and scheelite ($CaWO_4$), of which the former is the more abundant. Wolframite is a black mineral of 7.1 to 7.55 sp. gr., and 5 to 5.5 in the scale of hardness. Sometimes it is weakly magnetic. Scheclite, on the other hand, is a light-colored mineral of vitreous lustre and white streak. Its color may be white, yellowish-white, pale yellow, brownish, and sometimes orange-yellow. Its hardness is 4.5 to 5, and specific gravity 5.9 to 6.076. Scheelite contains 80.6 per cent. tungsten trioxide against 76.47 per cent. in wolframite.

Iron.—During the past year the Londonderry Iron Company did not mine any ore, or have a furnace in blast. The foundry was kept employed, and several thousand tons of castings turned out. About eight hundred tons of ore were sold to the Nova Scotia Steel Company.

At Bridgeville, Pictou County, the returns of the Nova Scotia Steel Company show that about 19,000 tons of ore were mined. The following memo. shows the work performed during the summer at the mine of the Charcoal-Iron Company.

BRIDGEVILLE IRON MINE.

A. S. Stevens is underground manager, and W. B. Moore, general manager at this mine.

A place was started on the south level and driven to the deep for a distance of 40 feet, then north 25 feet. From this point a place was driven back up the hill to the level for an air return. Owing to the rapid accumulation of water, this work has been abandoned. There is plenty of ore on the north side to supply the present demands. A level is being driven on the north side to connect with the old Brook tunnel. When this is completed it will improve the air. A place has also been driven on this side to the dip, a distance of 70 feet, where a place has been turned south which will connect with the one on the south side already mentioned as standing idle. This vein of ore is 16 feet thick, and is taken out by means of a tailrope from the slope engine. There are at present 38 men employed in and around this mine. It is well timbered and in good condition.

The Company produced about 11,250 tons of washed ore. There were thirty miners and fifteen laborers employed below ground and four skilled workmen and four laborers. The number of days worked underground was 10,804 and above ground 1,450. The Company disposed of all the pig iron now in stock and leased their furnace plant to the Mineral Products Co., of New York, for the purpose of making Ferro-Manganese. Manganese briquettes are made at Hillsboro, New Brunswick, from a deposit of bog ore, and shipped to this furnace. There are now about 2,000 tons of

briquettes in stock at the furnace and about 75,000 bushels of charcoal. The stack has been relined and is expected to go into blast the first of the year. A stock-house for charcoal was built, 80 by 40 feet, and a new pump, 12 × 7 × 12 inches, was placed in the Mine. The only accident during the year occurred to A. F. Grant, foreman. A new rope, with socket, had been ordered and put on the slope. On shoving over the empty box the rope pulled out of the socket, and the box running down the slope overturned a full box, which broke Grant's leg. About 10,000 tons of washed ore were sold to the Nova Scotia Steel Company, and ran from 47 to 49 per cent. of metallic iron.

Steel.—The Nova Scotia Steel Company imported in addition about 30,000 ton of ore from their Newfoundland mine.

In Cape Breton additional prospecting on the Iron ores at Indian Mountain, Whycocomagh, have shown deposits of workable size, and below the Bessemer phosphorous limit. In the neighborhood of George's River, in Cape Breton County, large tracts of country have been applied for, said to contain extensive deposits of magnetite and hematite. Other discoveries are reported from Mira and Louisburg. The attention being paid to Iron ore in Cape Breton at present is presumably due to the reported starting of a large blast furnace plant at Louisburg.

Manganese.—Little work was done at the older mines. Mr. Miner T. Foster, of Halifax, opened a vein of manganese ore near New Germany, Lunenburg County, from which a trial cargo of 50 tons has been shipped to New York. The ore is of good quality, and the deposits are believed to be extensive.

I have the honor to remain,

Your obedient servant,

E. GILPIN, Jr.

TABLES.

LIST OF MINERAL LEASES (OTHER THAN GOLD.)

IRON.

No. of Lease.	Name of Owner.	County.	Agent or Manager.	Address.	No of Sq. Miles.
36, 93	Moseley, E. T	Cape Breton			2
145	McLean, Jno	"			1
91, 232	Brookman, P	"			2
92	Matheson, D	"			1
102	Smith, W	"			1
103	McKenzie, H. R	"			1
104	McKenzie, J. W	"			1
43, 44, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59	Bartlett, J. H	Pictou			15
60, 68, 70, 71	Nova Scotia Steel Co	"			4
61, 67	Cameron, J. A	"			2
1	McIntosh, J. C	Hants			1
2	McDonald, L	Antigonish			1
5	McDougald, J	"			1
10	Fraser, W. J	Inverness			1
1, 2, 83	Nova Scotia Steel Co	Guysboro			2
82	McMillan, J. R	Pictou			1
191, 197	McKean, Jno	Cape Breton			2
2	Miller, J. C	Halifax			1
238	Matheson, A	Cape Breton			1
					43

	COPPER.				
145	McLean, J.	Cape Breton			1
142	LeCras, H	"			1
126	Matheson, A	"			1
116	Greener, J	"			1
95, 106	Cape Breton Copper Co	"			2
105, 181	Burchell, J. E.	"			2
94	McKenzie, D	"			1
2	Grant, J. A	Antigonish			1
4	McInnis, Hugh	"			1
7	Nichols, T	Victoria			1
6	Hardman, J. E.	"			1
5	Cove, J. W	Colchester			1
135	McKenzie, R	Cape Breton			½
238	McKenzie, J. A	"			½
					15
	LEAD.				
143	Cape Breton Silver Mining Co	Cape Breton			1
2, 3	Fraser, C. F.	Colchester			2
					3
	COAL.				
83, 84, 85	Barton, A. McG	Pictou			3
3/1, $\frac{1}{2}$3, $\frac{2}{4}$2, 3, 4, 62, 63, 64, 69	Acadia Coal Co	"	H. S. Poole	Stellarton	18
5/12, 6/13, 7/14	Intercolonial Coal Co.	"	C. Fergie	Westville	3
			Carried	*forward*	25

LIST OF MINERAL LEASES (OTHER THAN GOLD.)—*Continued.*

COAL.

No. of Lease.	Name of Owner.	County.	Agent or Manager.	Address.	No of Sq. Miles.
				Br't forward.	25
8/6	Nova Scotia Steel Co	Pictou			1
10/24	Richey, M. H	"			1
11/11, 45, 9/10	Gray, B. G	"			4
66/46	Fergie, C	"			1
46, 83, 70, 68	Nova Scotia Steel Co	"			4
76	Murray, S	"			1
					36
56, 22/51, 74, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 14	Canada Coals & R'y Co	Cumberland			15
19/44, 55, 16 17 18 20 21 / 6, 7, 8, 52 55 61, 62, 70, 71, 72, 73, 75, 76, 77, 78, 79, 81, 82, 83, 84, 85, 87, 88, 90, 177, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120, 121, 122, 123, 124	Cumberland Rail'y & Coal Co.	"	J. R. Cowans.	Springhill.	49
8/5	Lawson Mining Co	"			1
6/12	Londonderry Iron Co.	"			1
15	Prospect Mining Co.	"			
9/22, 10 11 12 13 / 23, 28, 29, 30	Styles Mining Co.	"			5

23/53	Binney, J. W	"			1
24/47, 25/49	Boston Coal Mining Co	"			2
57	Salt Springs Coal Co.	"			1
93	Wallace, H. N.	"			1
26/16	Minudie M. & T. Co	"			1
58, 59, 60, 61	Tupper, C. H	"			4
63, 93, 105	Leckie, R. G.	"			3
65	Annand, C	"			1
66, 67, 68, 69, 127, 128, 129	Cowans, J. R.	"			7
80	Gue, T. R.	"			1
86	Rutherford, J	"			1
91	Fraser, H. R.	"			1
89, 131	Hickman, J. S.	"			2
94, 107	Weatherbe, U. J.	"			2
94	Hayward, A. A	"			1
106	Vroom, W. E	"			1
107	Fitzsimmons, R	"			1
125	Franklyn, Geo. E.	"			1
21	Drury, H. A.	"			1
					104
13/79, 1/27, 2, 3, 28, 29, 30	General Mining Association	Cape Breton.	R. H. Brown.	Sydney Mines	23
173, 58/67	Weatherbe, R. L.	"			2
42/52, 49/53	McLeod, Hugh.	"			2
			Carried	*forward*	27

LIST OF MINERAL LEASES (OTHER THAN GOLD.)—*Continued.*

COAL.—*(Continued.)*

No. of Lease.	Name of Owner.	County.	Agent or Manager.	Address.	No of Sq. Miles.
				Br't forward.	27
207, 45/5, 46/28, 47/29, 50/40, 51/41, 52/42, 60/54, 61/55, 62/56, 63/57, 64/58, 65/59, 66/60, 67/61, 68/62, 69/63, 108, 109, 110, 125, 137, 162, 188, 207, 140, etc	Dominion Coal Co.	Cape Breton.	H. Donkin	Glace Bay	94
117	Hamilton, A. G	"			1
142	LeCras, Henry.	"			1
220, 214	Cayley, H. St. Q.	"			2
116, 164	N. S. M. & T. Co.	"			3
179, 180, 168, 190, 208, 223	Roberts, F	"			6
112, 113, 114, 115, 118, 42	Cowans, R	"			6
130	Fairbanks, E. C	"			1
212, 131, 219, 128, 129, 134, 135, 136, 139, 144	Moseley, E. T	"			10
138, 149, 184, 203, 224, 235	White, A. J	"			6
141, 177, 140, 213	Cumberland Ry. & Coal Co.	"			4
146, 193, 194, 216	Newcastle Coal Syndicate	"			4
159, 160	Morrison, A. G.	"			2
166	Dunn, J.	"			1

161, 222, 237	Routledge, T.	"			3
169, 170, 183	McVey, Jas	"			3
178	Routledge, E.	"			1
165	Stephens, L. H	"			1
163, 185	Hamilton, C. F.	"			2
199, 176	Copeland, J. D.	"			4
171, 174, 212	Gorham, J. W.	"			3
181, 211, 233, 236	Burchell, J. E.	"			4
215	McKinnon, D. L	"			1
234	Ross, H.	"			1
209, 206, 186, 187, 202, 205, 206, 209	Kennelly, D. J.	"			1
210	Harold, T. C.	"			1
196	Routledge, T.	"			1
201, 221	Hickey, C.	"			2
204	Morrison, M.	"			1
0	McCuish, A.	"			1
192	McKenzie, J. A.	"			1
198	McKenzie, Jas. A.	"			1
175	McDonald, J. W	"			1
182, 200, 225	Cossitt, G. G.	"			3
167	Murray, J.	"			1
189	Morrison, J	"			1
191	Tremaine, L. E.	"			1
197	McVicar, J	"			1
229	Matheson, D.	"			1
0	Ross, H.	"			1
218	Morrison, D.	"			1
				Carried forward	

LIST OF MINING LEASES (OTHER THAN GOLD.)—(*Continued.*)

IRON—(*Continued.*)

No. of Lease.	Name of Owner.	County.	Agent or Manager.	Address.	No of Sq. Miles.
				Br't. forward..	
219	Way, H.	Cape Breton...	.....	.....	1
226	Stephen, A	"	.....	.....	1
227	Johnson, J. A	"	.....	.....	1
228	McKenzie, J. A	"	.....	.....	1
231	Owen, J. M	"	.....	.....	1
1/2	Burchell Bros	Victoria	J. T. Burchell.	N. Campbl't'n	3
1/13	McGregor, J. D	Inverness....	.....	.....	3
2/6	Ross, H. E	"	.....	.....	1
6/4, 7/10	Shannon, S. L.	"	.....	.....	1
8, 9, 10	Fraser, J. W.	"	.....	.....	3
11	Dawson, G	"	.....	.....	1
19, 20	Smythe, J. J.	"	.....	.....	2
12, 13, 14, 15	Broad Cove Coal Co	"	W. P. Hussey.	Broad Cove..	4
26	McKenzie, J. W	"	"	"	1
18, 16	Drummond, R.	"	"	"	2
40, 41	Cowie, A. J	"	"	"	2

0	McNab, W	"	"	"	1
24	Hussey, W. P	"	"	"	1
23, 25, 28	McColl, J.	"	"	"	3
27, 3/11	Boston & N. S. Coal Co.	"	"	"	2
31	Tupper, M	"	"	"	1
29, 30	Tremaine, E. D	"	"	"	2
35, 38, 39, 0, 0	Ross, W	"	"	"	5
32, 33, 34, 42	Wallace, W. V.	"	"	"	4
43, 44	Farquhar, J. A.	"	"	"	2
					44
1, 7, 8	Terminal, City Co	Richmond	"	"	3
2	Columbia Coal Co	"	"	"	1
3	Reynolds, W. K	"	"	"	1
5	Chisholm, W	"	"	"	1
4, 6, 9	Lennoxville T. & C. Co.	"	"	"	3
0	Catherine, Jos.	"	"	"	1
11	Cape Breton Copper Co.	"	"	"	1
					11

COAL—Sales.

Names.	1st Quarter.	2nd Quarter.	3rd Quarter.	4th Quarter.	Year 1898.	Year 1897.
Nova Scotia:						
Land Sales...	93,337	76,045	82,317	78,522	330,221	324,608
Sea Borne...	123,452	41,661	64,645	107,273	337,031	316,700
Total N. S..	216,789	117,706	146,962	185,795	667,252	641,308
New Brunswick ..	74,490	65,697	60,336	66,266	266,789	242,043
Newfoundland....	47,870	12,752	8,447	24,172	93,241	75,990
P. E. Island.....	22,568	54	16,776	22,653	62,051	62,032
Quebec	151,205	10,517	295,012	487,426	944,160	875,874
West Indies	.....	.....	.....	.....	.....	9,356
United States	17,329	18,861	32,992	28,845	98,027	106,279
Other Countries...	.....	102	2,968	807	3,877	538
Total	530,251	225,689	653,493	815,964	2,135,397	2,013,421

COAL—General Statement.

1898.	Produce.	Sales.	Colliery Consumption.
1st Quarter.....	577,643	530,251	49,699
2nd "	296,625	225,689	45,539
2rd "	596,542	563,493	37,574
4th "	810,644	815,964	37,203
Total.....	2,281,454	2,135,397	170,015

COAL PRODUCE OF NOVA SCOTIA FOR YEAR ENDED SEPTEMBER 30, 1898.

COLLIERY.	Produce.	Sold.		Total Sold.	Colliery Consumption.	
		Round.	Slack.		Engines	Workmen.
Joggins	70,521	58,090	6,023	6,413	4,269	1,629
Scotia	485	285	80	365	.....	70
Springhill	338,934	160,767	127,025	287,792	22,349	5,852
Acadia	198,939	110,806	62,361	173,167	25,899	4,704
Intercolonial	222,386	132,481	75,767	208,248	11,523	3,850
Dominion	1,155,311	914,183	225,730	1,139,913	42,397	17,529
Sydney Mines	273,904	197,803	45,835	243,638	14,875	12,181
North Syndey	7,186	5,845	1,200	7,045	65	130
Mabou	325	315	.....	315	.....	.....
New Campbelltown	8,441	5,993	.....	5,993	1,580	405
Broad Cove	5,022	4,663	145	4,808	618	90
	2,281,454	1,591,231	544,166	2 135,397	123,575	46,440

Statement of number and classes of men employed at each Coal Mine, during the Year ended Sept. 30, 1898.

COLLIERY.	Underground.				Above Ground.				Construction.				Total.		Horses.		Pits worked.
	Skilled Labor.	Labo'rs.	Boys.	Days' Labor.	Skilled Labor.	Labo'rs.	Boys.	Days' Labor.	Skilled Labor.	Labo'rs.	Boys.	Days' Labor.	Persons.	Days' Labor.	Above.	Below	Days App.
Joggins	92	61	30	41,458	5	52	11	15,763	2	..	..	381	253	57,602	5	7	256
Jubilee	3	....	....	653	1	1	....	385	1	..	..	134	6	1,172	1	....	61
Springhill	302	251	65	146,650	76	103	27	54,646	4	.	..	1,200	855	202,496	11	11	244
Acadia	250	203	64	108,344	61	116	34	55,459	....	..	.	.....	728	163,803	18	20	197
Intercolonial	182	126	81	98,347	48	87	28	46,004	14	23	2	5,870	591	150,221	9	15	272
Ritchie	1	....	....	180	1	....	....	30	....	.	..	.....	2	210	1	....	.....
Dominion Coal Co	519	330	111	318,431	83	147	26	108,562	....	.	..	.....	1116	426,993	30	94	164
Sydney Mines	410	60	111	155,538	86	105	40	64,518	10	4	1	4,255	827	224,311	11	65	289
North Sydney	11	3	....	3,532	3	2	....	1,204	1	2	..	198	22	4,934	1	....	222
Mabou	2	2	...	520	....	....	....	.....	....		..	.....	4	520	....	....	60
New Campbelton	20	7	1	6,238	2	4	....	21,98	...	..	..	.....	34	8,436	....	....	154
Broad Cove	10	5	1	4,247	1	0	0	192	32	..	..	7,671	49	12,110	1	1	295
	1,802	1,048	464	884,138	367	644	166	348,961	64	29	3	19,709	4487	1,252,808	88	213	

COAL.

NOVA SCOTIA EXPORTED TO THE UNITED STATES.

Years.	Tons.	Duty.	Years.	Tons.	Duty.
1850	118,173	24 ad.	1875	89,746	75
1851	116,274	"	1876	71,634	"
1852	87,542	"	1877	118,216	"
1853	120,764	"	1878	88,495	"
1854	139,125	Free.	1879	51,641	"
1855	103,222	"	1880	123,423	"
1856	126,152	"	1881	113,728	"
1857	123,335	"	1882	99,302	"
1858	186,743	"	1883	102,755	"
1859	122,720	"	1884	64,515	"
1860	149,289	"	1885	34,483	"
1861	204,457	"	1886	66,003	"
1862	192,612	"	1887	73,892	"
1863	282,775	"	1888	30,198	"
1864	347 594	"	1889	29,986	"
1865	465,194	"	1890	50,854	"
1866	404 252	"	1891	25,431	"
1867	338,492	$1.25	1892	13,883	"
1868	228,132	"	*1893	16,099	"
1869	257,485	"	†1894	79,837	40
1870	168,180	"	‡1895	73,097	"
1871	165,431	"	1896	174,919	"
1872	154,092	75	1897	106,279	"
1873	254 760	"	1898	98 027	"
1874	138 336	"			

NOTE.—The quantities given for the years 1852 to 1872 are on the authority of the Board of Trade, Philadelphia, and are probably under-estimated.

*Nine months only.

†NOTE.—After August 1st, 1894, duty on Round Coal 40 cents, on Culm or Slack, 15 cents.

‡Fiscal year begins October 1st, and ends September 30th. (Cap. 4, Acts 1893.)

PRODUCTION BY DISTRICTS FROM 1862 TO 1898.

DISTRICT	Tons Crushed.	Total Yield of Gold.			Average yield per ton.			Value @ $19 per Oz.
		Oz.	Dwts.	Gr.	Oz.	Dwts.	grs.	
Caribou & Moose River.	103036	39226	6	15	0	7	14	$ 745300
Montagu	23688	39148	12	13	1	13	1	743824
Oldham	45731	50310	.....	10	1	2	0	955890
Renfrew	48142	33869	8	2	0	14	1	643519
Sherbrooke	190021	128525	2	18	0	13	12	2441977
Stormont	115138	50700	16	15	0	8	19	963316
Tangier	43845	21533	17	10	0	9	19	409144
Uniacke	52555	37462	19	7	0	14	6	711797
Waverly	122347	61351	14	13	0	10	0	1165669
Salmon River	95601	39373	7	18	0	7	4	748094
Brookfield	25472	15389	3	4	0	12	1	292394
Whitburn	6343	9535	15	18	1	10	1	181180
Lake Cacha	21140	23153	18	7	1	1	21	439925
Rawdon	12158	9592	7	4	0	15	20	182255
Wine Harbor	43348	23253	14	2	0	13	11	555821
Fifteen Mile Stream	31233	15883	3	5	0	10	4	301780
Malaga	19767	17220	5	8	0	17	10	327185
Other Districts	63439	44921	18	13	0	14	3	853517
Total	1063008	666452	11	19	..	.	.	$1266258 87

TABLE A.—COAL TRADE BY COUNTIES FOR THE YEAR ENDED SEPTEMBER 30TH, 1898.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.	
	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.	Raised.	Sold.
1st Quarter.....	103,307	81,640	130,518	116,012	343,666	332,581	152	18	577,643	530,251
2nd "	113,412	90,659	67,447	58,077	114,426	76,303	1,340	650	296,625	225,689
3rd "	105,912	97,395	105,661	88,215	380,678	374,142	4,291	3,741	596,542	563,493
4th "	87,309	82,576	117,699	119,111	597,631	607,570	8,005	6,707	810,644	815,964
Total.....	4,09,940	352,270	421,325	381,415	1,436,401	1,390,596	13,788	11,116	2,281,454	2,135,397

TABLE B.—COAL TRADE BY COUNTIES FOR THE YEAR ENDED SEPTEMBER 30TH, 1898.

	Cumberland.		Pictou.		Cape Breton.		Other Counties.		Total.		Grand Total.
	Round.	Slack.	Round.	Slack.	Round.	Slack.	Round	Slack.	Round.	Slack.	
Nova Scotia:											
By Land	42,469	60,936	109,873	86,005	18,104	10,477	2,357	....	172,803	157,418	
By Sea	40	10	32,165	3,095	211,845	87,064	2,747	65	246,797	90,234	
Total N. S.	42,509	60,946	142,038	89,100	229,949	97,541	5,104	65	419,600	247,652	
New Brunswick	156,359	43,674	18,552	2,705	29,966	15,186	347	....	205,224	61,565	
Newfoundland	.....	.....	78	.....	88,904	3,269	990	....	89,972	3,269	
P. E. Island	.....	.....	13,428	18,407	8,941	18,066	3,129	80	25,498	36,553	
Quebec	20,054	3,293	68,885	27,916	745,018	77,593	1,401	....	835,358	108,802	
W. Indies	.....	.....	.....	.....	.....	.....	....	....	.....	.....	
United States	220	25,215	204	.....	12,532	59,856	....	....	12,956	85,071	
Other Countries	.....	.....	102	.....	2,521	1,254	....	....	2,623	1,254	
Total	219,142	133,128	243,287	138,128	1,117,831	272,765	10,971	145	1,591,231	544 166	

Nova Scotia Coal Sales, 1785 to 1898, (Inclusive.)

Year.	Sales.	Total.	Year.	Sales.	Total.
1785	1,668		1841	148,298	Forw'd 1,208,150
1786	2,000		1842	129,708	
1787			1843	105,161	
1788	10,681		1844	108,482	
1789			1845	150,674	
1790		14,439	1846	147,506	
1791	2,670		1847	201,650	
1792	2,143		1848	187,643	
1793	1,926		1849	174,592	
1794	4,405		1850	180,084	1,533,798
1795	5,320		1851	153,499	
1796	5,249		1852	188,076	
1797	6,039		1853	217,416	
1798	5,948		1854	234,812	
1799	8,947		1855	238,215	
1800	8,401	51,048	1856	253,492	
1801	5,775		1857	294,198	
1802	7,769		1858	226,725	
1803	6,601		1859	270,293	
1804	5,976		1860	322,593	2,399,319
1805	10,130		1861	326,429	
1806	4,938		1862	395,637	
1807	5,119		1863	429,351	
1808	6,616		1864	576,935	
1809	8,919		1865	635,586	
1810	8,609	70,442	1866	558,520	
1811	8,516		1867	471,185	
1812	9,570		1868	453,624	
1813	9,744		1869	511,795	
1814	9,866		1870	568,277	4,927,339
1815	9,336		1871	596,418	
1816	8,619		1872	785,914	
1817	9,284		1873	811,106	
1818	7,920		1874	749,127	
1819	8,692		1875	706,795	
1820	9,980	91,527	1876	634,207	
1821	11,388		1877	697,665	
1822	7,512		1878	693,511	
1823			1879	688,628	
1824	27,000		1880	954,659	7,317,430
1825			1881	1,035,014	
1826	12,600		1882	1,250,179	
1827	12,149		1883	1,297,523	
1828	20,967		1884	1,261,650	
1829	21,935		1885	1,254,510	
1830	27,269	140,820	1886	1,373,666	
1831	37,170		1887	1,519,684	
1832	5[illegible],369		1888	1,576,692	
1833	64,743		1889	1,755,107	
1834	50,813		1890	1,786,111	13,910,136
1835	56,434		1891	1,849 945	1,849,945
1836	107,593		1892	1,752,934	1,752,934
1837	118,942		*1893	1,485,924	1,485,924
1838	1[illegible]6,730		†1894	2,019,742	2,019,742
1839	145,962		1895	1,831,357	1,831,357
1840	101,198	839,954	1896	2,047,133	2,047,133
			1897	2,013,421	2,013,421
			1898	2,135,397	2,135,397
				Total.....	46,432,025

SUMMARY.

1785 to 1790	14,319	1841 to 1850	1,533,798
1791 to 1800	51,048	1851 to 1860	2,399,319
1801 to 1810	70,452	1861 to 1870	4,927,339
1811 to 1820	91,527	1871 to 1880	7,317,430
1821 to 1830	140,820	1881 to 1890	13,910,136
1831 to 1840	839,954		

*Nine months only. Fiscal year begins Oct. 1, and ends Sept. 30. (Cap. 4, Acts 1893.)

GOLD.

General Annual statement.

Year.	Total Ounces of Gold Extracted.			Stuff Crushed.	Total Days' Labor.
	Oz.	Dwts.	Grs.		
1862	7275	0	0	6473	156,000
1863	14001	14	17	17002	273,264
1864	20022	18	13	21434	252,720
1865	25454	4	8	24423	212,966
1866	25204	13	2	32162	211,796
1867	27314	11	11	31386	218 894
1868	20541	6	10	32262	241,462
1869	17868	0	19	35147	210,938
1870	19866	5	5	30829	173,680
1871	19227	7	4	30791	162,922
1872	13094	17	6	17093	112,476
1873	11852	7	19	17708	93,570
1874	9140	13	9	13844	77,246
1875	11208	14	19	14810	91,698
1876	12038	13	18	15490	111,304
1877	16882	6	1	17369	123,565
1878	12577	1	22	17990	110,422
1879	13801	8	10	15936	92,002
1880	13234	0	4	14037	103,826
1881	10756	13	2	15556	126,308
1882	14107	3	20	12081	106,884
1883	15446	9	23	25954	97,733
1884	16059	18	17	25147	118,087
1885	22202	12	20	28890	157,421
1886	23362	5	13	29010	128,880
1887	21211	17	18	22280	173 448
1888	22407	3	10	36178	163,772
1889	26155	6	13	39160	211,548
1890	24358	9	9	42749	160,164
1891	23391	..	..	35212	149,381
1892	21080	3	18	33633	120,761
1893*	14030	5	7	28040	97,471
1894	14980	7	13	39333	139,140
1895	22112	17	21	58082	159,564
1896	25596	14	6	65873	180,519
1897	26579	19	21	76559	207,255
1898	31104	17	..	86331	186,182
Total.	685551	5	14	1116254	5,715,239

* Nine months only.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.

MONTH.	Malaga Barrens.							Other Districts.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	1	.....	....	147	289	..	..	5	1181	47	.....	....	..	..
November	1	.....	....	123	320	..	..	5	1100	44	.....	....	..	..
December	1	.....	....	185	288	..	..	5	1029	41	.....	....	..	.
January	1	.....	....	190	307	..	..	5	.....	...	412	173	3	..
February	1	.....	....	108	188	..	..	5	.....	....	.....	....	..	..
March	1	.....	....	155	256	..	..	5	.....	....	2	1	14	..
April	1	.....	....	116	180	..	..	5	.....	...	.....	....	..	..
May	1	.....	....	176	212	..	..	5	.....	....	3	3	10	10
June	1	.....	....	.....	....	..	..	5	.....	....	.....	....	..	..
July	1	.....	....	.....	....	..	..	1	.....	....	500	21	1	..
August	1	.....	....	.....	....	..	..	1	.....	....	.....	....	..	..
September	1	.....	....	.....	....	..	..	1	.....	....	.....	....	..	..
Total	....	.....	....	1200	2040	..	..	....	3310	....	917	199	8	10

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

MONTH.	Gold River.							Kemptville.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines,	Days' Labor,	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	2	48	1	2	..	1	15	....	91	3	.....	..	..	..
November	2	75	3	11	78	3	19	....	449	17	.....	..	..	..
December	2	32	1	7	51	15	..	1	603	24	120	56	3	5
January	2	.....	....	6	61	7	..	1	462	18	45	17	2	.
February	2	.....	....	16	47	6	12	1	182	7	15	16	..	..
March	2	.....	....	28	6	19	6	....	176	7	.....	..	..	..
April	2	.....	....	16	157	4	7	....	175	7	.....	..	..	..
May	2	.....	....	16	125	6	12	1	182	7	8	4	..	..
June	2	.....	....	2	...	10	14	....	189	7	.....	..	..	..
July	2	.....	....	38	102	15	..	1	182	7	24	14	10	..
August	2	.....	....	59	36	4	10	1	180	7	16	2	..	..
September								....	178	7	.....	..	..	..
Total	....	185	....	201	667	13	23	....	3049	....	228	109	15	5

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

MONTH.	Millipsigate.							Lake Catcha.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz	Dwts.	Gr.
October	2	388	15	108	89	10	..	....	382	15	.....	..	..	..
November	2	424	16	259	204	10	..	1	408	19	.....	..	..	..
December	2	500	20	196	125	10	..	....	389	15	70	85	5	..
January	2	901	36	394	252	10	..	....	180	7	.....	..	..	..
February	2	776	31	200	75	10	..	....	150	6	17	33	7	4
March	2	1278	51	260	124	16	..	....	403	16	.....	..	..	..
April	2	945	37	230	83	10	..	....	499	19	79	84	10	..
May	2	1238	49	384	117	19	..	....	415	16	25	26	..	..
June	2	1293	51	345	216	3	..	....	619	24	78	52	10	18
July	2	602	24	200	71	9	..	....	350	14	15	24	6	..
August	2	820	32	430	133	17	..	....	23	1	22	21	7	13
September	2	769	30	415	134	17	..	....	.....	....	100	69	10	..
Total	....	9934	....	3421	1639	1	..	....	3908	....	406	396	16	11

Returns for Silver have also been made from this district, as follows:—May, 45 oz.; June, 40 oz., 10 dwts.; July, 10 oz., 10 dwts.; Aug., 14 oz., 3 dwts.; Sept., 24 oz., 10 dwts.

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

MONTH.	Sherbrooke.							Brookfield.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Day's Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	5	5031	201	1495	436	6	..	1	1438	57	890	372	..	..
November	5	5173	206	1475	409	9	..	1	1413	56	1134	512	18	..
December	5	4238	169	1247	335	14	12	1	1583	63	892	311	..	..
January	5	3153	126	933	277	10	12	1	1510	60	1069	342	..	..
February	5	3214	128	1204	589	17	3	1	1283	51	853	240	..	..
March	5	3751	150	1334	448	16	..	1	1157	46	918	235	..	..
April	5	3974	158	1689	464	4	..	1	1270	50	882	172	..	..
May	5	4014	160	1846	530	9	6	1	1327	53	1182	352	..	..
June	5	4391	175	1507	533	..	5	1	1368	54	1098	553	..	..
July	5	2794	111	1386	420	18	20	1	1367	54	942	316	..	..
August	5	3145	125	1485	384	3	..	1	1449	57	838	282	..	..
September	5	2950	118	1290	370	16	..	1	1277	51	414	167	..	..
Total	....	45828	...	16891	5201	5	10	...	16442	....	11112	3854	18	..

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued).*

MONTH.	Killag.							Uniacke.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	1	....	....	31	68	..	..	4	113	4	160	105	..	..
November	1	....	....	67	121	10	..	4	203	8	162	132	11	5
December	1	....	....	55	103	8	..	4	60	2	156	166	2	..
January	1	....	....	58	57	14	..	4	1282	51	176	290	..	..
February	1	....	....	82	77	2	..	4	1082	43	154	217	..	..
March	1	....	....	7	28	11	..	4	1405	56	188	184	12	18
April	....	....	....	....	..	..	..	4	1490	59	258	150	12	..
May	....	....	....	....	..	..	..	4	1720	68	60	120	5	..
June	....	....	....	....	..	..	..	4	1373	54	163	27	15	..
July	....	....	....	....	..	..	..	3	894	35	54	52	..	..
August	1	....	....	24	33	19	..	3	1331	53	209	185	13	..
September	1	....	....	31	66	4	..	3	1268	50	159	157	16	..
Total	....	....	....	355	556	8	..	....	12221	....	1899	1779	6	23

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

MONTH.	Stormont.							Fifteen Mile Stream.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	7	3811	152	3338	754	23	..	....	2174	86	.....	..	..	..
November	7	3906	156	2992	749	5	..	....	1200	48	.....	..	..	..
December	5	3593	143	2871	691	19	..	1	990	39	1160	292	..	..
January	7	2484	99	2895	741	18	..	....	576	23	.....	..	..	..
February	8	2727	109	2943	1098	13	14	....	419	16	.....	..	..	..
March	7	2783	111	3393	771	10	..	....	414	16	.....	..	..	..
April	5	6648	261	2660	566	6	..	....	530	21	.....	..	..	..
May	5	7766	310	2907	693	5	..	1	701	28	700	70	15	..
June	5	5781	271	2507	584	4	..	1	1064	42	600	68	..	..
July	6	3198	127	2691	598	9	..	1	865	34	110	75	..	..
August	6	3365	134	2873	557	3	..	1	813	32	375	53	5	..
September	6	3312	132	2747	579	1	12	1	753	30	430	38	..	..
Total	....	50374	....	34817	8386	17	2	....	10499	....	3495	537	..	..

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

MONTH.	Tangier.							Wine Harbor.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Gr.					Oz.	Dwt.	Gr.
October	1	....	....	54	76	18	..	....	216	8	.....	..	..	..
November	1	....	....	60	26	16	..	....	310	12	No	Crushing.		
December	1	....	....	60	44	7	..	....	361	14	.....	..	..	..
January	1	312	12	No	Crushing.			1	....	....	276	32	..	..
February	1	....	....	50	60	12	..	1	....	....	216	32	..	..
March	1	....	...	No	Crushing.			...	....	....	No	Crushing.		
April	1	....	....	184	228	..	..	....	....	....	.....	.	..	..
May	1	....	....	80	102	..	..	1	95	3	5	15	19	17
June	1	671	26	125	171	15	..	....	146	5	5	1	7	..
July	1	223	8	61	41	2	..	....	278	11	50	9	..	..
August	1	216	8	455	581	..	..	....	331	13	10	11	19	..
September	1	183	7	5	8	10	..	....	345	13	75	11	..	..
Total	....	1605	....	1134	1341	..	..	....	2082	....	637	113	5	17

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—*(Continued.)*

MONTH.	WAVERLY.							OLDHAM.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwt.	Grs.					Oz.	Dwt.	Grs.
October	2	.....	....	80	42	18	12	2	.....	...	5	93	..	..
November	2	140	5	82	40	9	22	2	.....	....	77	198	..	..
December	2	40	1	63	44	2	9	2	.....	....	99	211	17	12
January	2	.....	....	25	20	16	13	....	.....	....	.....	...	..	..
February	2	180	7	101	72	6	..	...	.....	....	.....	...	..	..
March	2	.....	...	84	59	6	3	2	.....	....	104	275	19	2
April	2	180	7	116	86	11	22	2	.....	....	71	110	11	18
May	2	218	8	45	27	14	17	....	.....	....	.....	...	..	..
June	2	110	4	33	10	8	4	2	.....	....	84	105	6	12
July	2	296	11	86	42	6	2	2	.....	....	86	95	11	..
August	2	284	11	49	30	3	3	2	.....	....	34	152	8	12
September	1	112	4	43	27	10	..	2	.....	....	71	86	15	6
Total	....	1560	....	807	504	13	11	....	.....	....	631	1329	9	14

MONTHLY STATEMENT FROM EACH GOLD DISTRICT.—(*Continued.*)

MONTH.	MONTAGUE.							CARIBOU.						
	No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.			No. of Mines.	Days' Labor.	No. of Men.	Tons Crushed.	Yield of Gold.		
					Oz.	Dwts.	Grs.					Oz.	Dwts.	Grs.
October	....	1491	59	162	138	15	7	3	1291	50	300	210	19	13
November	....	1513	60	155	98	14	..	4	1482	59	762	150	2	..
December	....	1492	59	225	132	19	2	4	1565	62	980	168	16	..
January	....	851	34	160	111	1	..	4	1761	70	623	143	6	..
February	....	817	32	175	76	12	..	3	1282	51	388	71	6	..
March	....	1145	45	244	117	5	20	4	1560	62	607	115	3	18
April	....	964	38	273	160	18	..	3	683	27	510	48	14	18
May	....	969	33	291	248	14	..	3	695	27	475	38	6	..
June	....	925	37	325	100	17	6	4	499	19	420	87	11	12
July	....	495	19	.....	...	..	..	3	1165	46	395	64	6	21
August	....	357	14	46	34	3	6	3	1280	51	388	59	14	21
September	....	410	16	56	30	10	16	4	1183	47	340	44	—	12
Total	....	11429	....	.....	1254	10	23	....	14416	....	6188	1201	7	19

INTERCOLONIAL RAILWAY.

Statement showing the various kinds of Coal (in tons) received from the different Mines for the use of the Intercolonial Railway, from 1st October, 1897 to 30th September, 1898.

MONTH.	Elkin Coal Company, Hampton.	Canada Coals & Railway Co "Joggins."		Cumberland Railway and Coal Co. "Springhill."			Acadia Coal Co. Acadia, Albion and Vale.				Intercolonial Coal Co. Drummond.		Dominion Coal Company.		General Mining Association.		New Campbellton Coll'ry. Burchell Bros.
	Blacksmith.	Round.	Run of Mine.	Round.	Slack.	Run of Mine.	Round.	Slack.	Run of Mine.	Coke.	Round.	Run of Mine.	Run of Mine.	Slack.	Round.	Run of Mine.	Round.
October, 1897	.....	1443	.....	2409	636	.....	2807	83	.....	14	2389	.....	9425	.....	710	.....	.....
November "	13½	1330	.....	2089	513	.....	4002	52	.....	.....	3960	.....	5227	.....	623	.....	.....
December, "	.....	1100	.....	2739	974	....	4635	41	.....	.....	5299	.....	.....	59	720	.....	.....
January, 1898	.....	1750	.....	4542	837	....	1525	.....	.....	.....	1617	.....	.....	.....	648	.....	.....
February, "	.....	1539	.....	5387	1118	.....	1219	76	.....	.....	1665	.....	.....	.....	506	.....	.....
March, "	.....	3719	.....	5280	882	.....	1639	49	.....	.....	1458	....	.....	.....	580	....	.....
April, "	.....	2278	.....	5215	409	.....	1157	49	.....	.....	1569	.....	....	.....	510	.....	.....
May, "	.....	1973	.....	6921	419	.....	910	45	.....	.....	1830	.....	.....	.....	544	.....	.....
June, "	.....	1756	.....	2872	523	.....	1972	52	.....	13½	1297	.....	2126	.....	555	.....	.....
July, "	.....	52	875	.....	434	4790	34	14	1794	....	.....	1326	3294	....	68	456	.....
August, "	.....	....	1814	19	383	6563	54	87	3168	.....	.....	516	2793	.....	.....	312	60
September "	.....	.....	2002	....	115	5455	150	73	2507	.....	.....	1019	4014	.....	....	590	.....
	13½	16940	4691	37473	7243	16808	20104	621	7469	27½	21084	2861	26879	59	5464	1358	60

INTERCOLONIAL RAILWAY.

Statement showing the number of Tons of Coal received at the following Stations, from the Mines in Nova Scotia, during the year ended the 30th September, 1898.

Destination.	Tons.	Destination.	Tons.
Halifax	54,653	Boisdale	14
Dartmouth	11,827	North Sydney Jct.	10
Waverley	541	North Sydney	80
Bedford	860	Sydney	117
Windsor Junction	10,498	Belmont	14
Wellington	31	Debert	7
Enfield	208	East Mines	83
Elmsdale	237	Londonderry	4,154
Milford	41	Wentworth	6
Shubenacadie	213	Greenville	14
Stewiacke	415	Oxford Junction	6
Brookfield	117	Oxford	608
Truro	12,061	Pugwash Junction	100
Valley	14	Pugwash	467
West River	36	Wallace	242
Glengarry	82	Tatamagouche	423
Hopewell	952	Denmark	59
Ferrona Junction	67,363	River John	291
Stellarton	3,875	Meadowville	46
Westville	14	Scotsburn	591
New Glasgow	8,315	Pictou	11,496
Trenton	46,492	Salt Springs	6
Pictou Landing	40,640	Springhill	89
West Merigomish	12	Athol	25
Merigomish	178	Maccan	6
Woodburn	6	Nappan	6
Avondale	54	Amherst	12,431
James River	7	Aulac	487
Antigonish	2,578	Sackville	4,042
Heatherton	39	Dorchester	1,216
Bayfield	54	Memramcook	266
Tracadie	31	Shediac	394
Harbor a Bouche	72	Point du Chene	110
Mulgrave	499	Moncton	12,743
Point Tupper	123	Salisbury	988
Grand Narrows	42	Peticodiac	468

INTERCOLONIAL RAILWAY—(*Continued.*)

Destination.	Tons.
Penobsquis	6
Sussex	87
Apohaqui	20
Bloomfield	18
Hampton	99
Rothsay	101
Cold Brook	1,855
St. John (local)	53,163
St. John (West)	582
Kent Junction	281
Rogersville	28
Barnaby River	6
Chatham Junction	7,848
Millerton	135
Indiantown	6
Newcastle	40
Gloucester Junction	1,160
Bathurst	19
Jacquet River	6
Nash's Creek	12
New Mills	42
Charlo	18
Dalhousie Junction	24
Dalhousie	17
Campbellton	117
Metapedia	1,700
Amqui	18
Cedar Hall	7
Ste. Flavie	27
Rimouski	97
Bic	21
St. Simon	7
Trois Pistoles	12
St. Eloie	13
River du Loup	2,511
L'Islet	16
St. Henri Junction	4,916
Chaudiere	1,040
Chaudiere Junction	113
Levis	868
Drummondville	20
St. Rosalie Junction	42
St. Hyacinthe	245
St. Lambert	187
St Henri	142
Montreal	1,147
Compton	32
Danville	87
Coaticooke	1,702
Waterville	18
Sherbrooke	23
Eastman	513
Magog	6,930
Total	403,429

RECAPITULATION.

Forwarded from	
Sydney	20,768
Maccan	32,707
Stellarton	196,818
Springhill	118,837
New Glasgow	18,963
Westville	15,336
Total	403,429

ORE BEARING SCHISTS

—OF—

Middle and Northern Cape Breton.

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LETTER OF TRANSMITTAL.

DR. E. GILPIN, JR.,

Deputy Commissioner and Inspector of Mines,

Province of Nova Scotia.

DEAR SIR:—I beg leave to transmit to you the results of surveys undertaken at your direction during a portion of the field season of 1898, in the island of Cape Breton. They are embodied in a paper entitled "The Ore-bearing Schists of Portions of Middle and Northern Cape Breton," with seven plates of maps and sections.

Very respectfully,

J. EDMUND WOODMAN.

Division of Geology, Harvard University
December 15th, 1898.

INTRODUCTION.

Owing in part, perhaps, to the later opening up of the country; in part to the mistakes of a few investors; and in part to the fact that there is in Cape Breton no one series of ore-bearing rocks of wide extent, easily recognized, the island has not received in the past the attention paid to equal areas of the mainland of Nova Scotia. In this we must except the interest in the coal formations of the Sydney Basin on the east. Moreover, for some reasons difficult to discover, the firm belief appears fixed in the minds of many that nothing good of a metallic nature can come out of the island. That this is a false impression, anyone can learn by a sufficiently careful study of the rocks. There is no doubt but that the region occupied by the older rocks is one in which a number of districts are capable of successful development, if judiciously handled, with the proper distribution of men and money. I am the more pleased to have arrived at this opinion because it has been reached by direct field work, influenced by no prepossession in favor of the region, with little hope held out except by a few who had seen some of the territory, and with full knowledge of the well-nigh universal condemnation accorded to the country in commercial circles. I would be unjust if I were to convey the impression that I have seen anything which indicates the presence of enormous wealth in the rocks of any locality. But it is not upon such foundations that the prosperity of a region can be based. Prosperity is far more likely to follow the healthy development of lasting investments which yield moderate rewards; and I believe there is room for such in the ores of Cape Breton. To make the best use of whatever may be in the rocks, however, thorough and systematic study must go hand in hand with investment. This is true both of the region as a whole and of individual prospects. The erratic and unscientific method of much of the search must be held responsible for a fair share of the failure to see any good in the country. A day does not suffice to exhaust the possibilities of a mining district, nor does the sight of two or three localities determine the worth of a prospect. Much will be gained if, instead of the common method, one be employed by the enquirer which shall include a study of the structure, the probable limits of the field in which ore is claimed to occur, and the chances that that particular method of ore formation may be duplicated in kind in the adjacent territory.

The method followed in this paper has been to describe in some detail those portions of the three selected regions which were most available, from either artificial or natural exposures; and to let these serve for some generalizations by myself, and still more by any who may find the research serviceable.

The rocks in which part, at least, of the ores may be expected are, as a whole, the oldest on the island, and are colored pink on the geological maps of the Geological Survey of Canada. But not all of the large areas occupied by these are favorable to ore deposits, according to the experience of the past. Except in erratic veins, whose distribution cannot be foretold, the oldest igneous rocks cannot be looked to as a source of metals. These appear in many cases to form a core in the patches of pre-Cambrian, around which highly metamorphosed sediments wrap. The latter are usually schistose; and in them or connected with intrusions into them the ores of gold, silver and copper may be expected. It is well, therefore, to look these over carefully; and they deserve study as a whole, to discover more than has yet been done their distribution and limits.

In estimating the prospect of success in a given area, where ore may be found at some distance from the coast and from flat-floored valleys, it must not be forgotten that a problem faces us which is not met on the mainland—that of transportation. Whether it be the moving of crude ore or machinery, the cost of production will be materially increased by the topographic obstacles. I am assured, however, that it has long been a settled policy with the department of Works and Mines to arrange for a liberal subsidy for new roads necessary to open up mineral localities which have proved their promise.

The chemical tests contained in the following notes have been made by the firm of Simonds and Wainwright, of New York. Mr. J. W. Folsom has aided me in some of the drawings. I have to acknowledge great courtesy from all with whom I have dealt in connection with this research, among whom must be mentioned especially Mr. W. C. Scranton of Baddeck, Mr. T. Mitchell of Whycocomagh, and Mr. H. H. Harrison of Cheticamp.

THE GOLD REGION OF MIDDLE RIVER.

Situation and General Character.—The "Gold Brooks" of Middle river are tributaries from the south, the first of them joining the river four miles above the Upper Settlement, near the house of Kenneth McLennan. There are four of these brooks, numbered from one to four, number one being westernmost. The surrounding country is a flat upland, seven hundred to nine hundred feet above sea-level. From this upland, which in many places forms "barrens," the streams descend in irregular courses, following in general the structure of the rocks. Usually for several hundred yards of their upper reaches they have barely strength enough to clear the surface boulders of organic debris; but they rapidly gain in grade and velocity, and for the lower portions have cut down through six or seven hundred feet of rock. It is in these narrow glens that the best exposures may be found; and prospecting is facilitated by the fact that in their lower parts the brooks cut directly across the strike of the rocks. So far as seen, the glacial drift which mantles the bed-rock throughout the lowland areas does not reach the Gold Brooks. As a direct consequence of this, the prospector is free from the composite "surface" so common elsewhere. Moreover, he can depend upon the loose fragments, or "float," to give a clue to the distribution of the various formations below, as success in tracing veins for several hundred feet in such a manner has shown me at Middle river.

General Structure.—The main portion of the barrens on the south consists of a complex of granitic rocks, which have not yet been studied. It is certain, however, that they are of diverse ages and show intricate relations. Like all the Archæan areas, they will repay the petrographer well for any study he may make upon them. Against these lies a series of probably Algonkian metamorphic slates, and chloritic and sericitic schists. In many places the true slaty nature of the rock is readily distinguishable, from the small amount of alteration which has taken place. From these stages it is easy to follow the series into the condition of schist, and to see that the planes of schistosity are really planes of bedding, which metamorphism has nowhere been sufficient to obliterate. The fissility of these rocks is due to the presence of secondary muscovite, biotite, actinolite, chlorite, sericite, and possibly talc. That there are several separate series is evident. Yet in the present state of our knowledge the attempt to define these and to give them names would be folly.

Into these rocks have come many veins, chiefly of quartz. A large number are mere lenses, extending only a few feet, and either cut the strata or lie in the bedding-planes. In general, the gangue

is rather cellular. I do not consider the fancied resemblance of the quartz in these veins, noted by early students, to that in the bedded veins of the metamorphic slates of Nova Scotia as of any weight. The origin of the ore here is different, and the two series have little in common. In addition to the lenses are more persistent veins, most of which lie with the strata; but a few occupy fissures of the ordinary type. Where the veins are most abundant a dike of quartz porphyry outcrops, having the same strike as the sediments, and lying nearly in the bedding-planes.

The whole series of metamorphosed sediments dips down under the cloak of lower Carboniferous rocks which underlies the main valley of Middle river.

First Brook.—At this brook a small tongue of lower Carboniferous projects southeast an eighth of a mile beyond the house. Like most of the rock of that age along Middle river, it is now worn down so as to form a lateral extension of the main valley. From the contact between this and the older series a fairly steep grade ascends to the upland barrens. The stream does not head far enough south to penetrate the granite area, but runs throughout its course in Algonkian rocks.

Close to the opening of the glen, the brook turns at right angles. Here several veins outcrop, apparently lying in the plane of the bedding, with a strike of N. 35° E. mag., and a dip of about 75° N. The quartz is much crushed and stained with limonite, and shows no trace of metallic ores. The country-rock everywhere along the brook is a garnetiferous schist containing chlorite and sericite, and has a uniform and persistent strike. In the bed of the stream the boulders in the lower portion are chiefly of schist. Higher up pieces of quartz porphyry appear. This is the best evidence of the presence at this brook of the dike which plays so prominent a part in the section along Second brook. At about the place where this dike might be expected to appear a rock may be seen which resembles the general ground-mass of the porphyry, but is less red and more dense. It is narrowly and evenly banded in an east and west direction, and is an exact counterpart of the marginal portions of the dike at Second brook. The outcrops suffice only to give these characteristics; but it is almost certain that the porphyritic portion lies concealed a few feet farther south. The syenite gneiss of the next brook does not appear; but this is not strange, as the intrusion may be merely local, not extending so far. Much quartz is present on the hillsides and in the brook in small boulders; but few veins can be seen in place, and those are barren. The quartz boulders bear the aspect, however, of not having travelled far, for in many cases the soft walls of sericitic schist remain. Here and there throughout the lower two-thirds of the brook are evidences of former workings or prospects, but nothing more extensive than small dumps and one short ditch running north and south. None of the dumps show any ore.

In its lower half the brook runs almost down the dip of the schist. In its upper half, however, its course is parallel with the strike; and

this feature of adjustment to structure is noticeable to a greater or less extent in all neighboring streams.

SECOND BROOK.—Second brook is much larger than First, and has a narrow steep-sided valley to within a few yards of its mouth. Between the two streams schist outcrops in places on the bank of the main river. Here the beds are knotted and crumpled and show the spotted condition of early stages in the formation of garnets by metamorphism. The variation in strike, due to crumpling, is only local. This irregularity obtains also in the lower portion of second brook; but the stratification becomes more even and the dip steadily higher southward toward the granite area. In the exposures along the main river are a number of veins, some of which are productive but of very low grade. Those carrying gold lie above the lower end of the long flat island. There are also to be found a number of quartz lenses up to a few feet in length, cutting across the strata. So far as known they are all barren.

In the glen of Second brook there are no veins in the lower portion which show any promise, and for two thousand feet from the mouth there is little of importance. At about this point the veins become more abundant, and several appear to be of economic value. Most of those here and farther south are conformable with the strata, but a few occupy true fissures. Among those is one designated by the owner as the "Lizard Lode." This is irregular in strike but runs very roughly parallel with the bedded leads. Its dip is north at a somewhat higher angle than that of the country-rock, and in places vertical. The fissure varies in width from fifteen inches to three feet, and is filled almost entirely by quartz, often with a banded structure near and parallel to the margins and with drusy cavities near the centre. The vein is frequently swelled and pinched, and slickensides along its contacts show much slipping. Both walls are of soft schist. Close to the foot-wall is a mass of hornblende syenite gneiss one hundred feet wide. The contacts of this belt on the north and on the south are not visible. Under the microscope the rock is seen to consist of orthoclase felspar, much crushed, and biotite, with a large amount of hornblende. All these show distortion by dynamic agencies A little apatite is present but no quartz. The whole rock is much weathered.

South of this intrusive is a peculiar black schist, more massive, than those on the north; which may be either a more metamorphosed portion of the same series as before noted, or of quite different origin. It is conformable under it. On the southern border of this, five hundred feet from the Lizard Lode and 2500 feet from the mouth of the brook, is a dike of quartz porphyry fifteen to thirty feet wide. This dike has the same east and west strike as the schists and apparently a somewhat higher dip. Its margins are irregular. It has been followed for three and one-half miles eastward from First brook and is fairly persistent in strike. The main portion of the dike consists of a fine-grained pinkish ground-mass, with phenocrysts of quartz and a few of orthoclase. On the margins these crystals are absent, and the rock takes on a dense flinty or felsitic appearance and

pinkish-brown color, and is banded parallel to the contact. Under the microscope the large quartz crystals show resorption due to partial melting of their mass. They are often surrounded by a thick rim of very fine particles of quartz and a brown polarizing substance which has regular crystal outlines, but which has not yet been determined. In addition to this is a brown non-polarizing mineral, distributed in irregular tufts of radiating fibers. These, with some plagioclase, constitute the ground-mass. The dike is of great interest from a petrographic standpoint, varying considerably from ordinary porphyries.

South of the dike the veins are more numerous than on the north. Most of them are known to be barren, but one or two near the dike carry metal. In general the veins, both barren and metalliferous, increase in number towards the dike and decrease rapidly away from it on either side. It is noticeable that both bedded and fissure veins near the dike possess characters of mineralization different from those in other parts of the schist series.

Beyond the dike, up to somewhat more than a mile from the mouth of the brook, the exposures show schists in every way like those on the north, and evidently a part of the same series. Those near the dike are more massive than the ones north of it, and become denser away from the intrusion. They strike roughly east and west magnetic, and dip north, more steeply than those near the mouth of the brook. Slickensides are abundant throughout the mile of section; and their freshness not only gives some idea of the amount of stress under which the rocks have been in ages past, but proves that they are still yielding to similar strains. To the south lies a granitite from which the schists dip off steeply. The granitite is a very acid variety, containing much quartz. It is friable, quite coarse, and of a red color, the last due to a partial weathering of its orthoclase felspar. Probably this is the same rock referred to as "red syenite" in the Report of Progress, 1882-3-4, of the Geological and Natural History Survey of Canada, p. 29 H.

Third Brook.—Between this and Second brook the main river is flanked by cliffs, now on one side, now on the other. This will render somewhat more expensive the carriage of ore from the third brook beyond. The rocks are not worthy of special note, being schists similar to the rest of the series.

It is impossible to correlate the veins outcropping along this brook with individual veins on the one next below. They are fewer in number, and do not show so much promise in the field. A number of small lenses are present, and altogether the aspect is much the same as in the outcrops along Middle river. The general section shows the same succession of rocks as on Second brook. On the whole the syenite gneiss grows wider toward the east and narrows considerably between First and Second brooks; and may die out entirely. It has not been recognized on First brook. The general sequence at Fourth brook is the same as at Third.

Origin of Ore.—That the ore and veins have a deep-seated origin is highly probable. Slight traces of gold have been reported in the

rocks on the north side of the river. But, although prospectors have searched the region, little has been found. The occurrence at the Gold Brooks is, I think, a local one; and is connected closely with the intrusion of quartz prophyry. It is impossible to say, without more minute study than the case warrants, whether the bedded veins and ore belong to a period before the deformation of the sediments or not. The fissure veins, at least, are the product of a later age. The gneiss and porphyry show two periods of eruption, and there may be also two of veining. All that can be said at present, is that the phenomena appear to indicate what is called solfataric action subsequent to, or roughly contemporaneous with, the instrusion of the prophyry. It frequently happens that after an attempt at volcanic action, vapors rise from the heated interior of the earth through any fissures that the rocks may possess, especially those near the vent through which the lava was forced up; and even when no distinct volcanic attempt can be detected, this takes place. When no fissures are present, these heated vapors penetrate the minute spaces between the grains or crystals in the rocks. Coming constantly to regions of less pressure and heat, they quickly lose their power of keeping in solution all the chemicals which in the depths they were able to hold, and so little by little they drop the silica, lime, metallic compounds, and other substances which they may have. In such a way the ore here probably orignated. The fine character of it, its extreme dissemination and the entire absence of pockets, all point to the conclusion that little concentration has taken place since the first formation of the veins.

Alluvium.—At the mouth of First brook, where the valley widens, sufficient alluvium has accumulated to hold considerable gold under the proper circumstances. Fifteen or twenty years ago this was panned by various individuals, with some success, according to report. That there was—and is still—gold in this deposit, is more than probable. But it is impossible that it should pay for any extensive investment of capital. The area of the gravel is entirely insufficient.

At the mouth of Second brook is the most promising alluvial deposit of the region. The surrounding topography shows that this mouth has shifted repeatedly, and at least one abandoned channel is visible at the present day. All the evidence goes to show that the brook has wandered back and forth over its bed here, driven by the changes in deposition of the main river as well as by variations initiated by itself. Hence, inasmuch as Second brook appears to cross the most valuable veins, its mouth, so well adapted to receive and hold any metal brought down from the hillside, should repay careful enquiry.

Between First and Second brooks, in the valley of the main river, there are flats of considerable area which may contain some gold carried past the mouth of the brook above. I am told that some gold has been obtained for a considerable distance below First brook, but there is little probability that it would prove of economic importance. Third brook itself apparently gives less than Second;

and the gravel about its mouth, while it may contain gold, is not so likely to prove of value as the region near the stream below. Between these two, flats alternate with holes; and it is improbable that gold would travel far down the stream. Transportation between Second and Third brooks would be somewhat costly and difficult.

ECONOMICS.—Second Brook is the best field for capital as far as known at present. The water power is fair. There is a head of about five hundred feet at the "Lizard Lode," but the stream is not large. However, in mid-summer it seemed sufficient for such operations as would be necessary in treating any amount of ore likely to be taken from the glen. Veins which are said to be auriferous, and which in some cases are readily seen to be so, have been stripped for a total length of 1,400 feet, and a vertical height of at least 700 feet. This should make it easy for anyone who desires to test the field carefully to procure unprejudiced samples himself, with little labor would yield a small net income. The gold is largely free, yet so fine as to be only occasionally visible to the naked eye. It is associated in the "Lizard Lode" with galena, pyrite, chalcopyrite and other sulphides. Apparently it is never in pockets, and on the whole is evenly distributed. An amalgamation assay was made by the analysts, of a combined sample of parts of three specimens, with the result that 78.7% free gold was saved on the plates. These statistics will give an idea of the character of the ore. The gangue is rather dense for crushing, but not too hard to give satisfactory results. Platinum is said to have been found frequently in the alluvium, and to have been detected in assays; but a test made for me failed to bring to light even a trace. Bismuth has been reported in a few instances.

There is ample room for development here, especially between First and Second brooks, and for an unknown distance east of the latter. The veins have been traced only a few hundred feet in this direction. But, while proper capitalization would bring success here, little success would attend divided interests. The manner in which present ownership of the land is distributed, and the limited field for operations, make this probable. Transportation down the valley of Middle river will not be difficult, although a good road is needed if activity arises.

I have had a number of assays made of the contents of the quartz veins of the Middle river. As my work was understood to be, as far as possible, of a general nature, I do not give the names of the veins, or the nature of the assays. They were of a very encouraging character, a number running several ounces of gold to the ton. Should these results be confirmed by larger and more systematic sampling and assays, it would appear that in this locality decided auriferous values are available to the miner.

In general, since the auriferous veins accompany the quartz porphyry dike, the region covered by the length of the dike should be prospected by occasional north-south trenches running across the dike and for half a mile beyond. If, as seems probable, the

syenite gneiss diverges from the dike eastward, veins may be found somewhat farther away from the dike as one goes east. Not enough is known of the country to tell with any certainty whether such efforts will meet with success, but the exploration is worth making. Some of the leads near Second brook have been followed for at least 500 feet, and seem very persistent. As a rule the upland surface between the brook glens has no outcrops and is heavily covered with vegetation. But the surface "float" ought to show something of what is below, upon uncovering the matted vegetable remains. The glens will give rock sections except close to their heads. The element of transportation must not be overlooked in prospecting the region. The farther east one goes, beyond Second brook, the more difficult it will be to carry ore down the valley. The upland would be suitable by deviating from a straight course far enough to avoid the glens which head there, but this would necessitate a long journey. The valley of the main river contains cliffs, already mentioned, which would make road-building expensive.

WHYCOCOMAGH.

Situation.—The gold district here lies in the hills north of the village of Whycocomagh, which stretch up into the "Mullach." The general geology is briefly as follows: The oldest rocks are supposed to be pre-Cambrian. They consist of crystallines and metamorphic sediments, the latter probably of Algonkian age, with very involved and obscure structure and history. Long after they were formed and had passed through the most complicated portions of their history, they lay in part beneath the water. This was very early in the Carboniferous era. Many feet of sediments were laid down in this water, made from the waste of the older rocks. These sediments have since became hardened and otherwise changed. The whole country has been raised again, and the softer Carboniferons conglomerates, shales, sandstones, limestones, etc, have been, for the most part, eroded into valleys, leaving the older rocks on hills or level uplands. It is in these eminences that the gold here and near Middle river and the silver-lead ores at Cheticamp are found, and the outlines given above will apply as well to those districts.

There are two areas of these old rocks at Whycocomagh. One lies west of the bay and embraces the heights called the Craignish hills, including Skye mountain. The other takes in the Mullach, north of the village, and extends well up to the south end of Lake Ainslee.

Craignish Hills.—This area has been described as consisting largely of limestone on its northern side, but in reality there is comparatively little. The rocks have never been properly divided into series, but are mainly schistose. A few quartz veins occur with the same strike as the schists. Near the head of a small branch of Brigend (now called Roseburn) brook, north of Rory

Gillis' house, a small amount of copper has been found in the form of chalcopyrite, azurite, malachite, and possibly chrysocolla. The minerals occur in quartz veins, the attitude of which has not been determined. The quantity does not warrant any exploitation, although several barrels of ore have been shipped away at various times. On the road along Brigend brook, near the saw-mill, is a deposit of talc of some extent.

Mullach Area.—The critical section of these old rocks, for economic purposes, is that shown in and near a tunnel one and a half miles north of Bay View hotel. This appears to have been open for some years, but is only a prospect. It lies on an unnamed brook, the first one south of Mullach brook, on the south side of the Mullach. The tunnel runs north at a point where the brook turns quite abruptly from a south to a southwest course. It gives the following section northward, the distances, which are roughly estimated, being horizontal and not intended to represent thickness of the strata:—

(1)—Dark green schist	10	feet.
(2)—Limestone, strike N. 65° W. mag., dip 48° N.	15	"
(3)—Quartzite	100	"
(4)—Limestone to end of tunnel	15	"
	140	feet.

At the contact of (2) with (1), which has the same strike and dip as the banding of the limestone, the schist is soft and crumbly, and tongues into the limestone. The appearance suggests that an ordinary sedimentary contact has been faulted in the course of the metamorphic and orogenic processes to which it has been subjected. Schistose spots also appear in the limestone, due probably to a local formation of serpentine and chlorite. The quartzite has a shear-zone at each contact. Indeed, it looks frequently as though the schist and quartzite graded into each other. The schistosity is due in part at least, to the presence of innumerable small slickensided lenses, which are themselves fairly hard. The quartzite has been called "felsite" by some students. But thin sections under the microscrope show a fragmental character, the quartz grains and secondary quartz being easily seen. The grains are extremely fine, and interlock closely. A wavy extinction under the polarizer shows how strong the orogenic forces are which have acted upon it. The cement is largely quartz and calcite, but not entirely. The remainder cannot be determined, because of the small polarization.

South of the tunnel, near its mouth, it is more quartzite. Down the brook the section shows alternations of quartzite and limestone for a considerable, but unmeasured distance South of this for five hundred yards is a belt of a coarse, pink granitite. Beyond this is more quartzite to the edge of the pre-Cambrian area. No ore has been found south of the tunnel. The lowest of the metamorphic Carboniferous series at this point is a conglomerate member, resting, of course, unconformably upon the older rocks.

Northward from the tunnel the rock is chiefly limestone, as far as any outcrops are visible in the stream bed. One hundred yards north of the mouth of the tunnel, a quartz vein five inches thick crosses the stream with a direction N. 15° W., and a high northeast dip. North of the vein are three inches of quartzite, and beyond this two feet of schist, then four feet of limestone, the outcrop ending here. Much ore occurs in the vein and quartzite and a small amount in the limestone. Bands of ore cross the stream in several places beyond this, but in general becomes less abundant away from the tunnel.

THE ORE AND ITS ORIGIN.—The ore throughout this region consists to the eye chiefly of massive and granular arsenopyrite. Here and there is a little pyrite or chalcopyrite, but these are not abundant. The sulphides sometimes occur in veins of quartz, but usually in the country-rock without gangue. Where the limestone is mineralized, the metals lie along the planes of schistosity, and their general distribution appears to bear no relation to the presence or absence of veins. The chief part of the ore is to be found in the quartzite; and where the limestone contains sulphides, quartzite is usually not far distant. In places where this rock appears to merge into the dark green schist, the ore runs for some distance into the latter; but as a rule the schist is barren. Almost all of the quartzite is impregnated with arsenopyrite to such an extent that particles of it are visible in every piece. Frequently, however, the mineral is concentrated in bands or lenses, roughly parallel with the contacts of the quartzite with its neighbors. A number of these lenses cross the brook or are visible on its side within half a mile north of the tunnel. In a few cases distinct lenses are visible in quartz veins. At a distance from the tunnel an increasing proportion of pyrite and chalcopyrite appears.

It seems evident that there is a close connection between the presence of the ore and of the band of quartzite. It has been stated that the connection of the ore was with the metamorphic limestone, but the abundance of the former in the quartzite and its steady diminution away from that rock seem to point to the other conclusion. The crystals of the sulphides are scattered irregularly through the mass of quartz grains, where not bunched together, and appear to have no connection with each other. The ore has suffered all the changes which have affected the country-rock. The most probable history, from the evidence gathered thus far, is that the metallic compounds came into the rock by solfataric action from below, while it was still an ordinary sandstone, as has often happened in other places. Then the after history of the sediments has affected also the ores, perhap aiding in their concentration. The alternative possibility here is that the necessary materials existed in the sediments, and have been merely concentrated by metamorphic agencies. But the scarcity of sulphides in the finer sediments, now transformed into schists, makes this improbable.

ALLUVIUM.—In the lower reaches of the brook on which the tunnel is situated, sluicing on a small scale has been carried on

with success. Some of the gold which I have seen is much coarser than any at Middle river. Two or three pennyweights are sometimes taken out in a day. The appearance of the grains is not different from that of most placer gold, except that the shape suggests a shorter passage in the water than often is the case. Not enough silt can accumulate anywhere on this brook to employ more than two or three men, or to give sufficient returns to warrant a company working it. Two or three men can probably earn laborers' pay from it. Its chief interest lies in the positive proof which it gives of the presence of an appreciable amount of gold higher up in the basin included in the drainage area of this brook and its tributaries.

The only stream whose valley will permit the detention of sufficient alluvium to form a large placer deposit is Mullach brook. Below the margin of the pre-Cambrian rocks the valley widens rapidly, while the walls are tolerably steep. The bottom is flat. From here to the mouth, where the brook empties into Skye river, the gravel flood-plain is continuous and of considerable depth. A number of pits have been dug, the lowest of them east of the fence which runs across the valley at the end of the wagon trail. Here the bed-rock is four feet down. The gravel is reported to grow deeper up-stream, the deepest shaft—twenty feet—not reaching bottom.

The material varies much in texture, but is never very fine. It consists of boulders of granite; quartzite of at least two aspects, pink and gray; quartz, and in the lower portion conglomerate. The filling between the boulders is largely quartz, with garnets and magnetite in the sandy portions. The stratification is poor. A little gold was seen during my study of the area. An assay gave only a trace, but it was hardly a fair sample, as it was taken from the surface. Those who have opened the pits and shafts report that the metal is not in flakes, but in fairly coarse, irregular masses, often perforated. An average yield of $2 to $3 per ton is claimed for it.

The source of the gold is evidently the head-water region of the brook and its branches within the pre-Cambrian area. The abundance of quartzite and absence of limestone are suggestive, as is also the predominance of quartz among the finer constituents. I have found such a difference in composition between the two portions of a coarse conglomerate to be of frequent occurrence, as in the fossil placer of Gay's River, Colchester county, Nova Scotia.

Upon the moderate estimate of 2,000 yards workable length, 220 yards average width and 4 yards depth, the contents of the placer would be 1,760,000 cubic yards and its weight approximately 3,000,000 tons.

Economics.—The extent of the mineralized zone along the strike is not known, but appearances seem to indicate that it runs for a quarter of a mile or more eastward and for three-quarters of a mile toward the west. The surface away from the brook is for the most part covered with vegetation and shows little bed-rock, but prospecting should be done in the direction indicated.

The belt is not a wide one. South of the tunnel there is probably little to be gained by exploration. As the formations dip northwest, and there is no evidence of an anticline, there is no probability of finding the same strata again anywhere to the south. Whether the occurrence of the ore is purely local it is impossible to say, but the fact that the sulphides are connected with the quartzite and not the limestone would indicate at least the impracticability of searching for gold elsewhere on the basis of the presence of limestone similar to this. Many other limestones have been seen in these old rocks, but unaccompanied by such deposits of ore.

As the general map shows, the area of old rocks over which prospecting could be done is somewhat more limited than the geological map of 1884 would lead one to suppose. That ore occurs north of the head-waters of this brook is known from the presence of placer gold in the lower reaches of Mullach brook. The nearer of the two coördinate branches which by their union form that stream, heads a mile from the source of the brook on which the tunnel is situated, and half a mile more from the tunnel itself. Between the two sources the land is quite high and flat, and it is certain that most of the water which finds its way into Mullach brook has not travelled far. There is, however, a small branch of Mullach brook which heads about half a mile north of the tunnel, and some gold may have travelled by this route.

Aside from tracing out the continuation of the quartzite stratum described in this paper, one who desires to develop the region should hunt for similar conditions among the other stratified portions of these old rocks. There is also the possibility of the presence of gold under conditions different from those which have been studied here. The absence of anything is hard to prove in geology; and all that can be done is to indicate the positive evidence obtained.

Three assays have been made of the rocks in and near the tunnel, and one from what appears to be a quartzite, on the southeast branch of Mullach brook—the one heading near that on which the tunnel is situated. Number (1) was almost pure sulphide, with a little quartz, and was selected for this purpose; (2) was quartzite, taken at random from within the tunnel, and well impregnated with sulphides; (3) was limestone taken from the same place, in the same way; (5) was taken at random from a portion of the brook above mentioned, where it was supposed that gold is present. The assay returns all gave the same results—a trace of gold and no silver.

This is significant, for several reasons. In the first place, the samples were such as ordinarily ought to give considerable variation in the amount of metal. In the second place, the amount of placer gold in the lower portions of the brook, and its coarseness, is sure indication that within the area drained by the stream there is more gold than the assays indicate. While we must accept the results of analysis for the immediate locality under discussion, I feel confident that the region embraced between this brook and Mullach brook contains gold in appreciable quantities. Whether it will be of economic importance remains to be seen. Certainly further exploration is worth making.

As regards copper, I do not consider any of it that has come under my notice as worth attention. An old property lies a little aside from the path leading from Whycocomagh to the tunnel, and to the east of it, on the top of the first hill. The character and extent of the deposit are not well known. The latter can be studied only by a sounding-rod, as there are no natural outcrops near the two small pits from which ore has been thrown up. The ore consists, as far as can yet be seen, chiefly of carbonates. An assay of a promising sample yielded only 1.64% copper. Under the circumstances, while exploration is advisable, there is nothing yet in sight to warrant the expenditure of money in development.

CHETICAMP.

Situation.—The general situation of the ore-bearing rocks at Cheticamp is somewhat different from that at the two other places. They form a portion of a great plateau covering most of northern Cape Breton ; and at their base lies, not the metamorphic portion of the lower Carboniferous, but the next succeeding group, which is unmetamorphosed. The former usually contributes both hills and valleys to the landscape; the latter only valleys, in this region. This lower portion consists at Cheticamp of a narrow strip along the coast, widening southward towards the village of Margaree Harbor ; and from it the outlying spurs of the pre-Cambrian plateau rise abruptly. From the center of the upland, streams flow westward to the gulf; and the spurs are formed by branches of these streams which have cut their way downward for hundreds of feet, and separated portions of what was once a unit. In the sections exposed along these brooks, a few outcrops of galena have been found by various prospectors. The country between the waterways is rugged, with steep sides and flat tops, and either covered by dense growths of wood or abounding in precipices and dangerous talus slopes. The most accessible route to the interior is Cheticamp river ; and along its course prospectors have travelled to and from the east coast. Some of its branches and the small brooks of the region have been explored in part ; but chiefly about two decades ago, when only slight traces of ore other than copper had been found.

Structure on Faribault Brook.—In ascending Cheticamp river, the first branch from the south which is met after leaving the Carboniferous area is Faribault brook. This stream is given the local name of L'abîme brook, because of a considerable gorge and fall one quarter of a mile above its junction with the main stream. The Carboniferous rocks extend in a tongue for three-quarters of a mile up the valley of the Cheticamp, beyond their limit in the surrounding region. The last outcrops are of fine red sandstone striking N 47° E. mag., and dipping 48° N. W. East of this for a fourth of a mile the outcrops along the river valley are of a white granite, very felspathic and considerably weathered. The surface float from the mountain to the south is also of this material. Certain others of the massive crystalline rocks are included within this range, but it

has been impossible in a reconnaissance to separate them areally. From the eastern edge of this granite mass, one-fourth of a mile below the junction of the brook with the main river, schist extends to near the head of the brook. The occurrence of massive plutonic rocks west of the metalliferous schists is interesting, for several reasons. In the first place the relations between the two classes of rock at this point are unknown. Thus it is possible that the granites are intrusives of younger age than the schists, and have cut them off. If this be so, they are different from the granites of the interior, some of which are manifestly older than any of the schistose rocks which have been explored, and lie unconformably beneath these metamorphic sediments. In the second place, they indicate that the presence of massive rocks on the coast and near the mouths of streams is no proof that ore-bearing schists may not be found in the interior. This is important to the prospector.

The sections along the lower portion of Faribault brook can best be seen on the line of the road to the shafts of the Cheticamp Mining Company. Close to the granite area it is impossible to observe the attitude of the schists. At the first exposures where the structure is plain, the strike is N. 38° W. mag., and the dip 30° N. E. Going southward along the brook, the strike gradually swings eastward, until at the first streamlet below the mine it is N. 5° W. mag., with the dip 40° N. E. At the shafts of the mine the strike has changed to N. 75° W. mag., with a dip 30° N. South of this, schists of approximately the same attitude continue for at least a mile. All these rocks appear to belong to the same series, and vary only in slight changes of color, texture and secondary minerals. The different varieties grade into each other, and it is impossible to make distinct subdivisions. South of the mine are two or three belts of what is locally called "whin." Whether it is the same as the whin of the metamorphic gold series of Nova Scotia is doubtful. From its appearance in the field, it may be a dense quartzite or a fine-textured trap. The attitude of these masses with relation to the schists cannot be seen.

The schists are not crystalline, but are clearly metamorphosed sediments, in places passing into chloritic slates. The secondary minerals will be referred to again in the discussion of the mine.

Ores on Faribault Brook.—The sulphide ores lie mainly in the bedding of the schists, either with or without the presence of quartz veins. At the openings of the Cheticamp Mining Company two inclines had been driven in the season 1898, for a few feet downward along the bedding-plane. The main portion of the rock in these is schist, but forming the hanging-wall of the first opening is a metamorphic slate, apparently quite distinct from the underlying rock. It was found upon examination, however, that the formation is not thick, and that above it lies more schist in a conformable position. The details of the contact, also, show that the slate is merely a less metamorphosed portion of the series, and not a separate member. Indeed, throughout the section cut by the brook, all the variations in the schist appear upon study to mean nothing but slight differences in the secondary ingredients.

A number of bedded veins occur in both the openings. For the most part they are barren, but occasionally contain small amounts of ore. A few cut across the planes of fissility. The veins are of two classes as regards appearance. One of these is composed entirely of a dense white quartz, while the other has also a quartz as pink as some weathered feldspar. In the latter case the two varieties are not banded, but are thoroughly mingled. As far as observable, the color is not due to secondary staining, but to an original impurity of the mineral.

The ores are blende (zinc sulphide), galena (lead sulphide), arsenopyrite, chalcopyrite, niccolite, and possibly pyrrhotite. The niccolite occurs as a common constituent of quartz veins, but also within the schist associated with galena. Chalcopyrite appears to be more frequently connected with veins than does niccolite. Arsenopyrite impregnated the rock in this belt more thoroughly than any other mineral. It is entirely granular and is frequently closely associated with galena. Assays show a small amount of gold in the schist, apparently all held by this mineral. The blende is found in rough lenses, in thin stringers and beds a few feet in length lying in the planes of schistosity, and in stringers occasionally cutting the beds through small fissures. In the first opening the ore appears to the eye to be almost entirely galena, with little blende. It is common here to find lenses, one end of which lies at one horizon and the other end several beds higher. These ends are conformable to the strata, but the central portion runs in a jagged rent between the two. The serrated appearance possibly indicates a slipping along the bedding-planes. It is interesting to note the lack of relation between the breadth of the ore bodies and the texture of their crystallization. In many instances, masses several inches in thickness are so fine-grained as to be almost granular. In other cases, ribbons scarcely half an inch wide have crystals which occupy a large fraction of their cross-section. In general, especially in the larger instances, the rule holds that the finer texture occupies the walls and the coarser crystals the interior. But even this is not without its exception, and here and there are examples in which the reverse is true. This shows how complex must have been the factors which influenced the deposition of the sulphides from the hot solutions or vapors.

The rocks at the lower opening give evidence of considerable dynamic action since the desposition of the ore. The planes of schistosity are often slickensided, and small over-thrust faults are abundant. This is illustrated at a depth of eight feet from the opening where a somewhat greasy garnet-schist is in contact with an underlying blue variety, and over-thrusting has taken place both along and across the bedding-planes. The ore penetrates in stringers into the overlying slate for about a foot.

The second opening is stratigraphically somewhat lower than the first, and does not show the hanging-wall of slate. The ore here is almost entirely blende, and very little galena is present. The country rock is a massive blue schist which underlies the light greasy variety of the first opening. It rarely contains garnets, or

even the little knot-like projections which are prophetic of future garnets, and is also much less fissile than the overlying beds. The blende occurs in irregular lenses and stringers approximately conformable with the strata, but rarely interesecting them. It is as abundant here as galena is in the first opening. It usually possesses a finely crystalline texture, and apparently never is as coarse as much of the galena.

On the mountain-side above the mine, float is found containing both galena and blende. The schists extend for a considerable but unknown distance to the east. Many of the exposures along the brook show gash veins cutting irregularly across the bedding and tapering quickly at both ends so as to form lenses. They are usually local, and so far as known are totally barren.

The mine is on the east side of the brook. Ore can be found also on the west side, and for a little way up the mountain. Beyond this the bed rock is thickly covered, and no prospecting has been done. It is certain, however, that there is a thickness of at least four hundred feet which contains ore and may be found valuable.

Origin of the ores.—The distribution of the sulphides points distinctly to the conclusion that none of them were connected in their genesis with the entrance either of the bedded veins or of the gash veins. Rather it appears that the veins are in a measure accidental as far as the ores are concerned. There is little doubt that the blende and galena came from below, and probably the other sulphides as well. In general the amount of those substances increases with the metamorphism of the country rock. It is probable that not all the changes in the slates were effected by dynamic action, but that heat and soltaric action have played an important part. A study of the surrounding rocks shows the improbability of concentration by lateral secretion, and moreover, only a small percentage of the ore lies in what were clearly pre-existing fissures. The differences in the character of distribution of the various minerals does not prove a variety of sources for them, but does appear to show different periods of concentration. Thus the arsenopyrite is present elsewhere, while the galena is limited to definite bands, lenses, etc., and only now and then does the microscope or lens show particles of it at a distance in the schist. Again, in the areas now opened in mining, galena is found abundantly in a zone below the slate belt already mentioned; while blende is found in a belt several feet lower. The distribution in the margin between these two is not known. On the west side of the brook, galena occurs again in beds lower than those which contain the blende; and by means of "float" on the mountain-side to the east, and outcrops in the little canon a quarter of a mile below the mine, it is known that the ore also occurs considerably above the slate belt. It is upon this basis that the estimate of thickness given above is made.

Cheticamp River.— For some distance east of Faribault brook outcrops along the river are few. Schists of the same nature as those on the brook extend intermittently for several miles, but

show no trace of ore. Beyond the cabin of the game warden, which stands at the end of a trail leading up the valley bottom, the schists are intruded by granites. The strike of the planes of schistosity is in several places N. 40° E. mag., and the dip 32° S. E. The schists vary comparatively little throughout the distance observed, and appear to be of nearly the same hardness as the younger granites. Actinolite and chlorite are the commonest secondary minerals. In places the granite is so abundant that it has formed a coarse breccia with a granite base and innumerable horses of schist. Here and there both series of rocks are cut by irregular dikes of trap.

Structure Northward Along the Coast.—Robert brook flows throughout over igneous rocks—granites, amygdaloidal trap, quartz porphyries, etc. Jerome brook also passes over igneous rocks until it reaches the Carboniferous area near its mouth. For the last quarter of a mile it follows approximately the contact between this and the pre-Cambrian.

At various places along the coast schists appear, to a great extent similar to those on Faribault brook. The remainder of the shore, exclusive of the small patches of Carboniferous sandstones at Presq'ile, at the mouth of Trout brook, and south of Cape Rouge, consists of massive coarse-grained igneous rocks, for the most part granites. In several instances contacts between these and the schists indicate that the former are intrusive into the latter. This is an encouraging point, for if the granite were a part of the old core of this portion of the island there would be less probability of finding schistose rocks away from the coast. As it is, it is very possible that inland beyond the regions yet covered by prospectors, schists of economic value may be found.

At the old copper mine north of Jerome brook and south of Presqu'ile, chalcopyrite, malachite and chrysocolla occur in calcite veins in a dark trap which is sometimes massive and sometimes schistose. The trap is a local occurrence and intrudes into an acid granite. This variety of granite extends southward at least as far as Jerome brook. Between here and Presqu'ile granite lines the road in large part and is intersected by many trap dikes, some of them regular, some irregular. It would pay to examine these carefully for economic minerals.

On the side of the mountain east of the lake at Presqu'ile copper has been found in rather irregular calcite veins, lying in schist which strikes east and west mag. and dips 55° N. The vein where exposed is about three feet wide and its length is unknown. The calcite is very cellular, probably owing largely to solution. The ore occurs as chalcopyrite, malachite, chrysocolla and brown oxide. The minerals are often well crystallized and lie in separate small irregular masses, but are quite evenly distributed in the vein.

The schist along the shore from the southern end of the lake at Presqu'ile to Corney brook is similar to that at the second copper locality, lying approximately in the same position and varying throughout this distance only in minor details of texture and ingredients. Two hundred yards south of Corney brook the schist

ends against granite. At the stream is a complex of granites, and for at least one and one-half miles up the brook the bed-rock consists of granites, amygdaloidal trap, and several varieties of porphyry. Probably the large mass of schist to the south extends inland for some distance, forming a roughly crescent-shaped mass. Much of it resembles the lighter portion of the schists on Faribault brook, with talc and sericite and knots of minute garnets.

ALLUVIUM.—There is only one stream whose valley is broad enough to render washing for free gold possible on a large scale. On Faribault brook some panning has been done in a small way with good results, and doubtless some of the other brooks would also yield a little gold in sheltered places near their mouths where sediment may have accumulated. As a rule, however, the grade is too steep to allow much metal to come to rest, and the deposits of alluvium are too small for other than hand work. The lower portion of the valley of Cheticamp river is flat-floored and covered with water-worn boulders and gravel over a varying but considerable width. But the rocks near the source have not been found to contain gold to any appreciable extent, and while many portions of the alluvium give a small yield there is nothing in sight to encourage prospecting.

ECONOMICS.—It is probable that here as elsewhere there is little to be gained by systematic searching for the precious metals in massive igneous rocks such as the granites. These rocks do contain gold and silver, but chiefly in irregular fissure veins whose distribution is erratic and ungoverned by any known laws. As an example of this, the cliffs immediately north of the mouth of Jerome brook show many large calcite veins which very possibly contain copper. In this case they are inaccessible, but there is no reason to suppose that this is the only portion of the granite areas which contains such veins. In general, then, it would be wise to examine carefully any such occurrences found within the granite zone. In regard to the region north of Jerome brook occupied by the schist, it is worth while to determine its extent inland and to prospect it carefully. It is highly probable that it contains much more copper than has ever been found in it. Its similarity to the schists of Faribault brook indicates also the possibility of silver-lead ores of some importance. Those on Faribault brook remained long unnoticed. Up Cheticamp river it appears as though little good would be gained by extensive search. Below the first gorge outcrops are few and unpromising. Something may be found, however, higher up on the sides of the hills near by. Whatever may come from this region will find easy transport to the coast, but beyond the lower end of the gorge the valley is narrow, steep-sided, and completely filled in times of freshets.

The schists south of Cheticamp river have been opened up sufficiently to show that they contain ores of some worth. It would be profitable to extend the explorations of these, both along the strike and also across it. In a few cases stream cuttings may serve, and in others the outcrops on the hillside are numerous enough to be of some aid; but artificial stripping of the surface will generally be necessary.

PLATE I.

General map of the Middle River region, from the map of the Canadian Geological Survey; showing the position of the district which has been for so long prospected for gold, and its relation to the surrounding country The parallel lines represent the Carboniferous in the valley of Middle River.

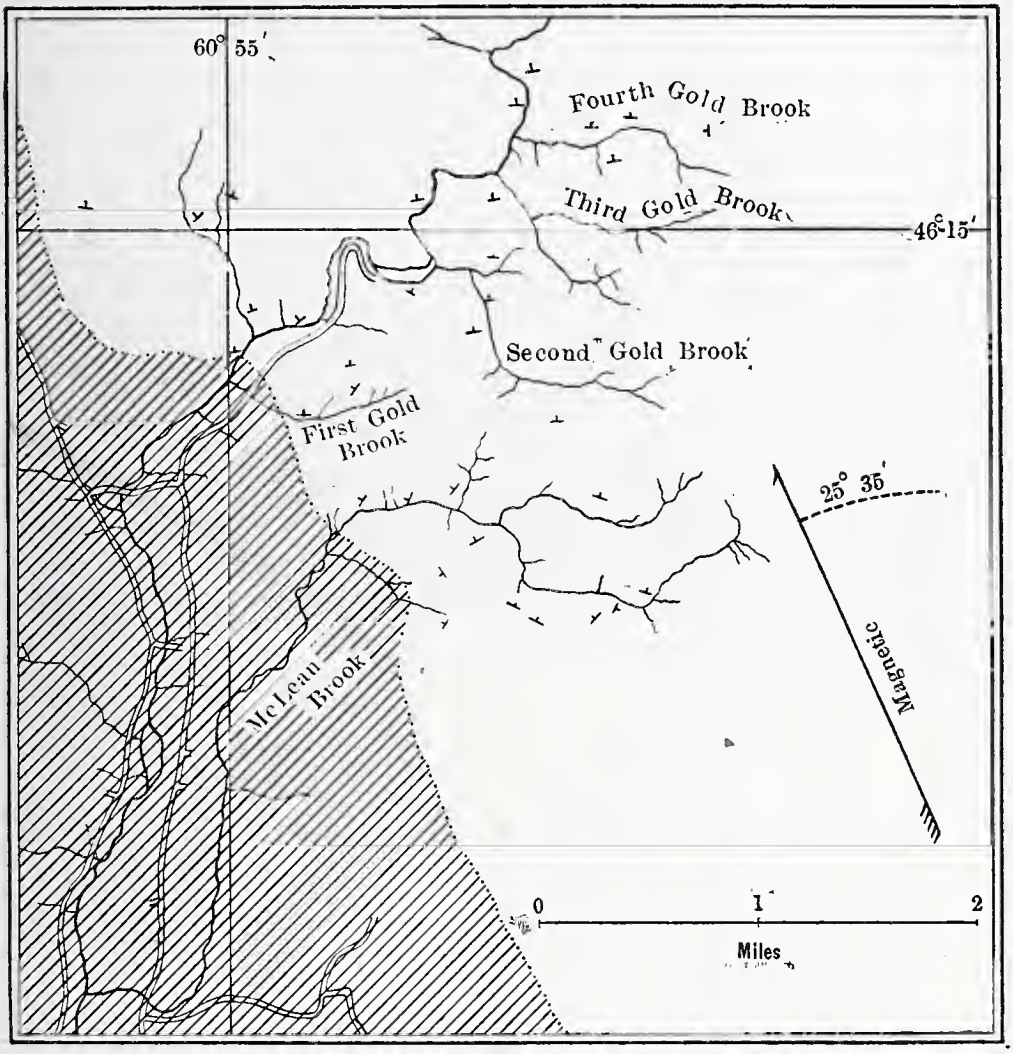

60° 55′
Fourth Gold Brook
Third Gold Brook
46° 15′
Second Gold Brook
First Gold Brook
25° 35′
McLean Brook
Magnetic
0
1
2
Miles

PLATE II.

Sketch map of the three lower brooks, altered from previous maps. The upper portion of the streams are wet-weather brooklets, lying *on* and not *in* the rocks. The portion of the quartz porphyry dike is shown in part. The broken line at the mouth of Second Brook marks the most apparent old bed of the stream.

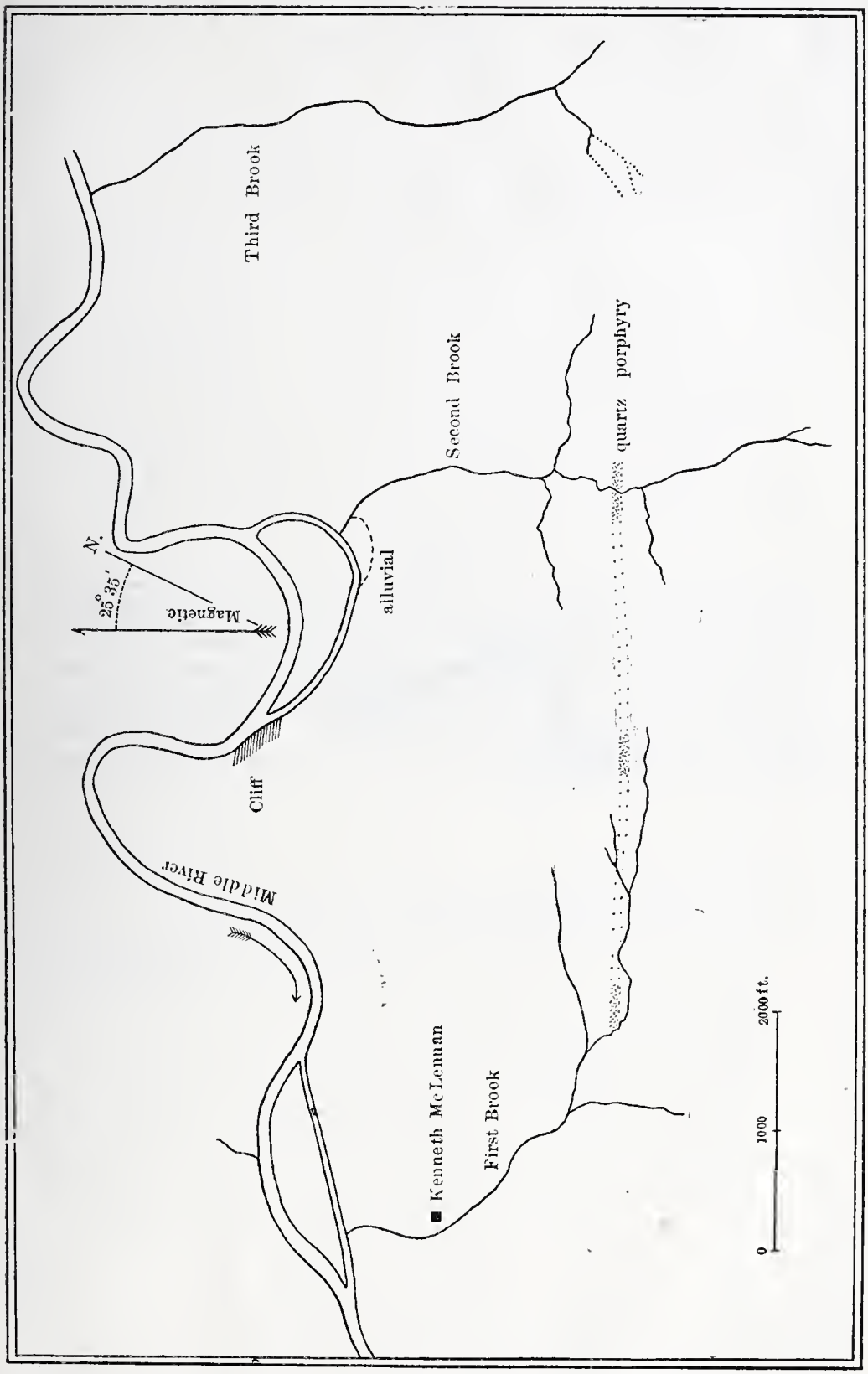

Third Brook
Second Brook
quartz porphyry
N.
26° 25′
Magnetic
alluvial
Cliff
Middle River
Kenneth McLennan
First Brook
0
1000
2000 ft.

PLATE III.

Sketch map of part of Second Brook, showing the "Lizard Lode" and accompanying rocks, not drawn to scale. North of the Lode is schist with a few bedded veins. For a few inches south of it is the same rock, while from this point to the dike is hornblende syenite-gneiss. The quartz porphyry dike is represented by diverted lines. South of this is schist, with other bedded veins. The solid portions of the lines show the parts of the veins which had been opened in 1898.

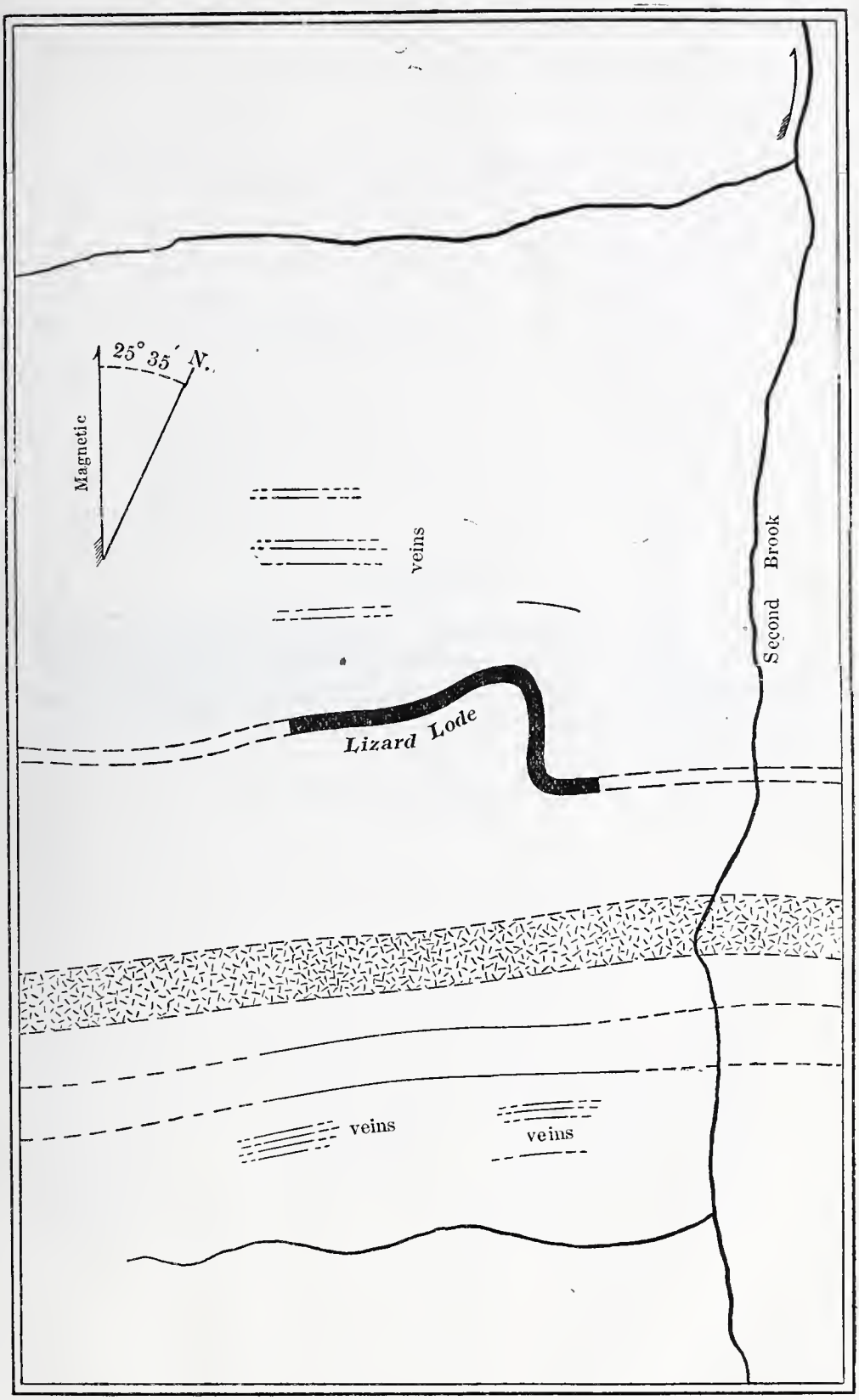

25° 35′ N.
Magnetic
veins
Lizard Lode
Second Brook
veins
veins

PLATE IV.

Figure 1. Map of Second Brook, showing the sequence of the rocks. (a.) alluvium ; (b.) schist ; (c.) hornblende syenite-gneiss, separated from the schist on the north side ; (d.) quartz porphyry dike, represented by heavy band ; (e.) granite, forming the core of the mass. Three bedded veins are shown in the schist just south of the dike.

Figure 2. Section of same, along the line A.—B.

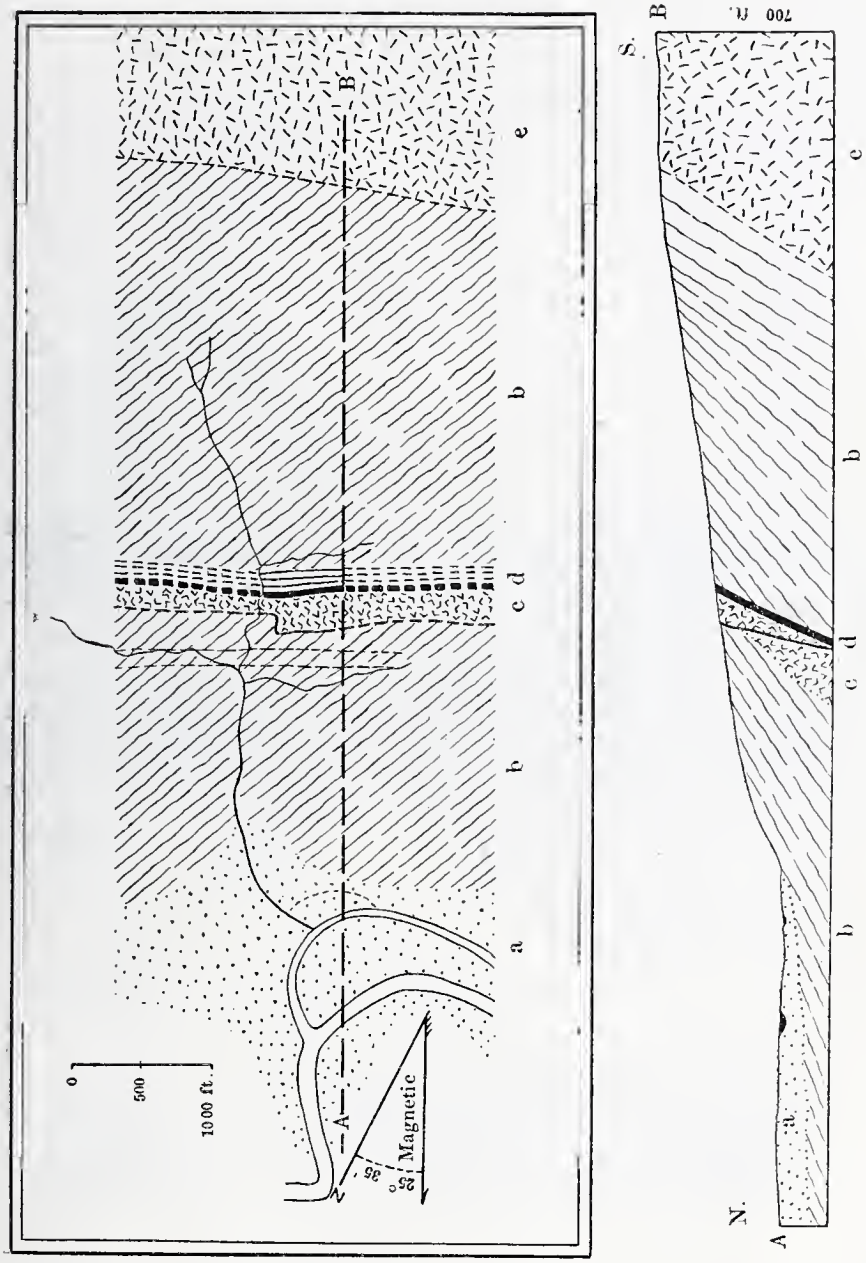
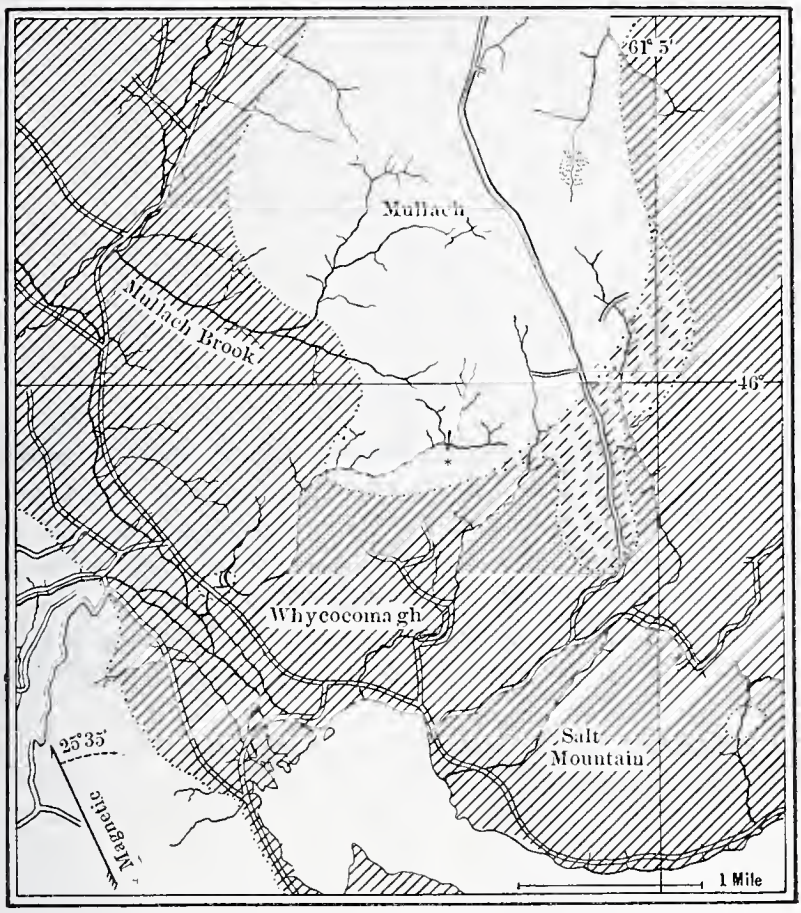

0
500
1000 ft.
Magnetic
25° 35'
A
B
a
b
c
d
e
S.
N.
700 ft.

PLATE V.

Figure 1. Map of the Whycocomagh region, altered from the map of the Canadian Geological Survey. The parallel lines represent the Carboniferous; those of open character north of Salt Mountain cover the area included in the Carboniferous in this paper.

Figure 2. Section along the line of the tunnel, marked on the map with an asterisk (*). 1, metamorphic limestone, containing some serpentine; 2, quartzite; 3, dark schist, grading into 2; 4, fissure vein of quartz, exposed in the stream bed north of the tunnel. The tunnel is shown by a heavy horizontal line, and represents 140 feet.


61° 5'
Mullach
Mullach Brook
46°
Whycocomagh
Salt
Mountain
25° 35'
Magnetic
1 Mile

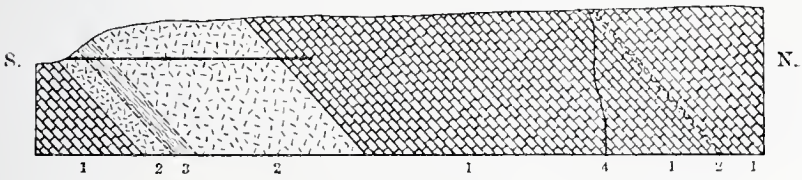

S.
N.
1 2 3 2 1 4 1 2 1

PLATE VI.

General map of the Cheticamp Region, altered from the map of the Canadian Geological Survey. The position of two copper deposits is shown by small circles and the letters, Cu. Two strikes and dips are given in figures, from observation ; the rest are taken from the above mentioned map, some of them agreeing with recent observations. The new road to the Galena Mine on Faribault Brook is drawn in without measurements and is approximate. The probable area of Schistose Rocks, north of Jerome Brook, is shown by a dotted line.

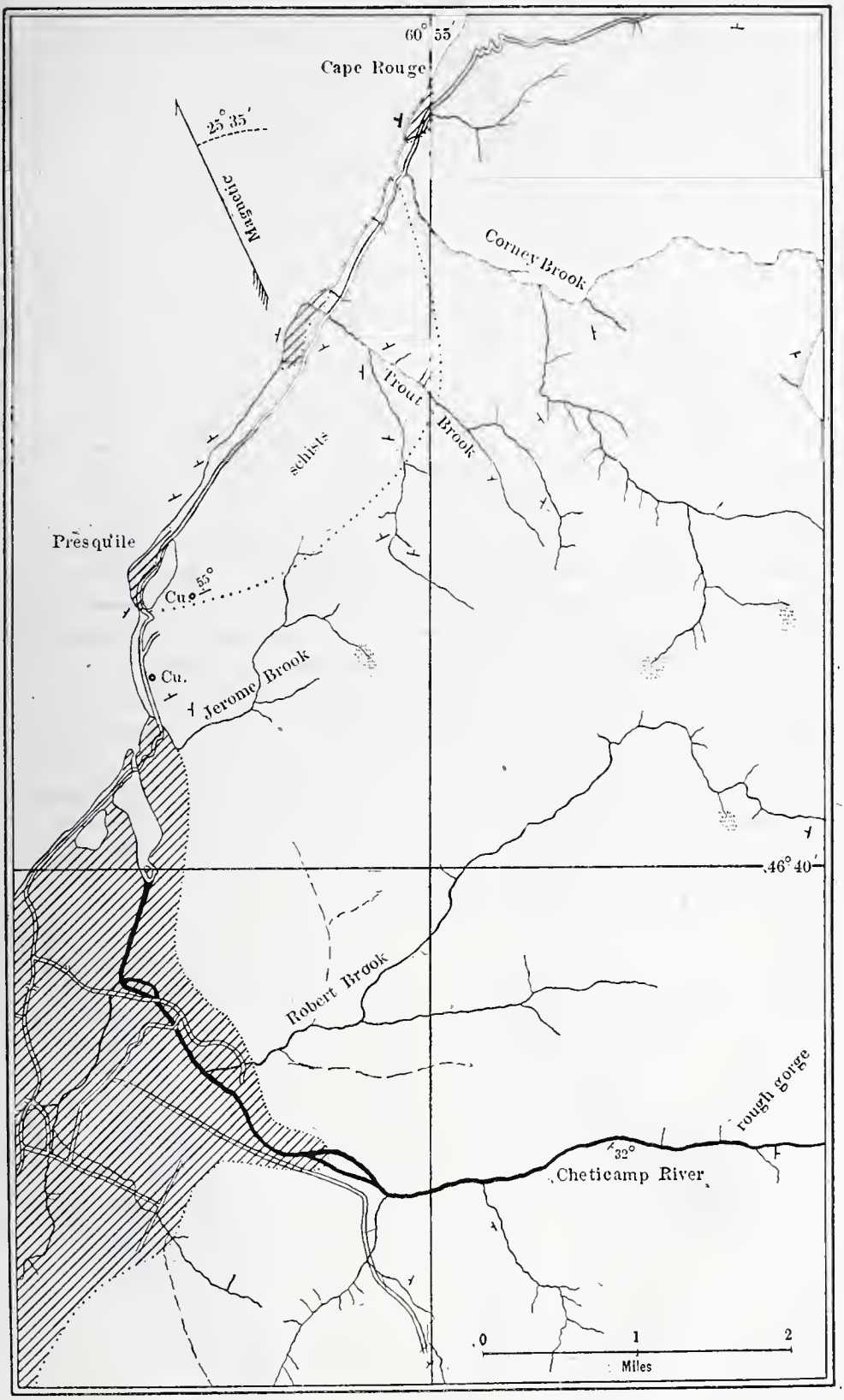

60° 55′
Cape Rouge
25° 35′
Magnetic
Corney Brook
Trout Brook
schists
Presqu'ile
Cu.
55°
Cu.
Jerome Brook
46° 40′
Robert Brook
rough gorge
32°
Cheticamp River
0
1
2
Miles

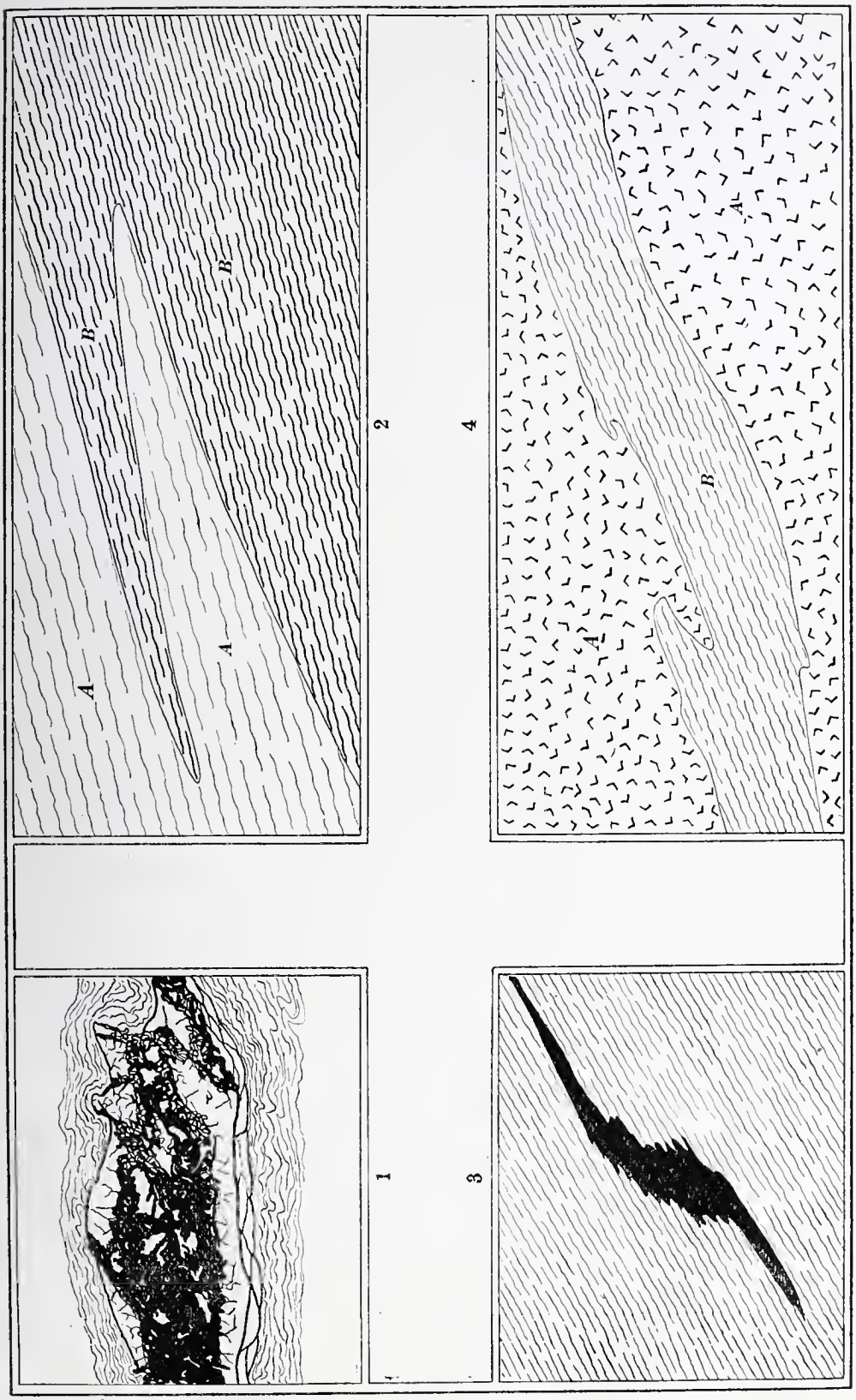
PLATE VII.

Figure 1. Section of quartz vein bearing galena, from the lower opening of the Galena Mine, Faribault Brook; enlarged. The outside portion is schist. Inside this comes quartz, often much cracked. The center is occupied chiefly by galena which, however, encloses many small pieces of quartz, and on its margins penetrates the outer quartz irregularly.

Figure 2. Contact of the two schists, eight feet below surface, lower opening, reduced, (A.) gray schist, (B.) blue schist. The inter-tonguing is caused by overthrusting.

Figure 3. Reduced section showing lens of galena cutting across planes of schistosity, lower opening.

Figure 4. Section of granitite, (A.) and schistose trap, (B) at old copper workings north of Jerome Brook, reduced.


A
B
A
B
2
A
B
A
4
1
3